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INCREASING TASK-ORIENTED BEHAVIOR--AN EXPERIMENTAL EVALUATION OF TRAINING TEACHERS IN REINFORCEMENT TECHNIQUES.

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THIS STUDY TESTED METHODS OF INCREASING TASK-ORIENTED BEHAVIOR OF INATTENTIVE SECOND-GRADE PUPILS TO HELP DEVELOP EFFECTIVE WORK HABITS AND ATTITUDES AT AN EARLY AGE. THE ASSUMPTION WAS MADE THAT THE INATTENTIVE BEHAVIOR OF PUPILS WAS MAINTAINED, IN PART, BY THE REINFORCEMENT UNINTENTIONALLY PROVIDED BY FREQUENT TEACHER REMINDERS FOR THE CHILD TO GET BACK TO WORK. IN ADDITION, THE TEACHER MIGHT NOT BE GIVING SUFFICIENT RECOGNITION AT TIMES WHEN THE PUPIL WAS ATTENDING TO HIS WORK. THE EXPERIMENTAL PROCEDURE REVERSED THESE CONTINGENCIES, URGING THE TEACHER TO WITHHOLD ATTENTION FROM PUPILS BEHAVING INATTENTIVELY AND REWARDING ATTENTIVE BEHAVIOR AS SOON AS IT OCCURRED. WHILE EXPERIMENTAL GROUP TEACHERS DID USE REINFORCEMENT METHODS, THEIR APPLICATION WAS LESS THAN DESIRED. THE EXPERIMENTAL GROUP SUBJECTS DID NOT SHOW A SIGNIFICANTLY GREATER FREQUENCY OF TASK-ORIENTED BEHAVIOR. THE RESULTS SUGGEST THAT THE TRAINING OF TEACHERS WAS CRUCIAL TO THE OUTCOME OF THE STUDY, AND ALSO RAISE QUESTIONS ABOUT THE EFFICACY OF COGNITIVE METHODS IN CHANGING TEACHER S BEHAVIOR. FUTURE RESEARCH SHOULD FIRST INSURE A THOROUGH APPLICATION OF THE TECHNIQUES BEFORE PUPIL BEHAVIOR IS ASSESSED. (GD)

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ABSTRACT

This study tested methods of increasing task-oriented behavior of inattentive second grade pupils to help develop effective work habits and attitudes at an early age. A two-phase hypothesis was examined. First, it was hypothesized that teachers trained to use certain reinforcement methods would show a greater application of those techniques than teachers not given the special training. Second, it was hypothesized that pupils whose teachers were trained in the recommended techniques would show (1) more task-oriented behaviors, (2) more independent task-oriented behaviors, and (3) more favorable behavior ratings by their teachers.

Fourteen second grade teachers identified a few children in their classes as those least able to sustain attention to tasks. The teachers were randomly assigned to control and experimental groups. Two pupils in each class were designated as subjects but only one was identified as such by his teacher. Both experimental and control group teachers were led to believe that they played an important part in the study.

Techniques based on principles of social learning theory formed the basis for the experimental procedure. The assumption was made that the inattentive behavior of pupils was maintained, in part, by the reinforcement unintentionally provided by frequent teacher reminders for the child to get back to work. In addition, the teacher might not be giving sufficient recognition at times when the pupil was attending to his work. The experimental procedure simply reversed these contingencies, urging the teacher to withhold attention from pupils behaving inattentively and rewarding attentive

behavior as soon as it occurred. Teachers were trained in group meetings and with individual consultations.

Criterion data were collected by observations of the behavior of teacher-pupil pairs and by ratings from teachers of their pupils' behavior. Paid observers were trained in the observation technique but were unaware of the purpose of the study and the identity of control and experimental subjects. An observation technique was designed which permitted simultaneous ratings to be made of both pupil and teacher behavior. Observations were made at the beginning, mid-way, and at the end of the six-week period. Teacher ratings of pupil behavior were made before and after the study on a 39-item rating scale.

First, results were analyzed to determine the effectiveness of the training given experimental group teachers to use the reinforcement procedures. By the end of the study experimental group teachers tended to make more use of reinforcement techniques than control group teachers but the differences were not clearly significant. The use of these methods by the experimental group was not consistent over the period of the study. While experimental group teachers did use reinforcement methods, their application was less than desired and was confined to pupils identified as subjects. The second set of hypotheses concerned the responses of pupils in the control and experimental classrooms. The experimental group subjects did not show a greater frequency of task-oriented behavior. While the task-oriented behavior of all groups improved during the study, the reinforcement procedures were no more effective than those of the control group.

Experimental group subjects showed a greater frequency of independent task-oriented behaviors than control group subjects, but differences between

the groups were not sufficiently large to confirm the hypothesis at the .05 level.

Experimental group subjects received no more favorable behavior ratings from their teachers than control group subjects. Identified and non-identified subjects showed about the same degree of improvement on all criterion measures and none of the interaction effects were significant.

The results of this study suggest that the training of teachers was crucial to the outcome of the study. In spite of their approval of reinforcement procedures, experimental group teachers found themselves unable to apply them consistently. Thus, the main effect of the training may have been for teachers to give recognition for inattentive behavior on a partial instead of a continuous reinforcement schedule. Such a change could be predicted to result in an increased frequency and intensity of inattentive or disruptive behaviors and could cancel any other improvements.

The results of this study also raise questions about the efficacy of cognitive methods in changing teachers' behavior, particularly when the expected change is incompatible with previous behaviors. Future research designed to test the effectiveness of reinforcement techniques should first insure a thorough application of the techniques before pupil behavior is assessed.

CHAPTER I

INTRODUCTION AND REVIEW OF THE LITERATURE

Statement of the Problem

The general purpose of this study is to evaluate the effectiveness of reinforcement methods in increasing task behaviors of pupils in the elementary school classroom. In order to retain the characteristics of a naturalistic setting, the experimenter trained second grade teachers to apply the reinforcement techniques themselves. In this way, the conduct of this investigation was directly analogous to the collaboration between the teacher and school psychologist regarding a referred child. First, the referred problem was explored to gain an understanding of the conditions which typically preceded and followed the troublesome behavior. Second, suggestions were made for rearranging the teacher's responses to eliminate or decrease inappropriate behaviors and increase desirable responses. Finally, an evaluation was performed to determine the effectiveness of the techniques applied.

Difficulty in sustaining attention is most evident when the child must work by himself. First and second grade children are generally able to perform adequately under the direct supervision of the teacher. The demand for independent work, however, places heavy burdens on their ability to recall instructions, to understand what is to be done, and to tolerate an absence of contact with the teacher for a period of time. Some children become restless if left alone for twenty minutes to work by themselves; they leave their seats, walk about the room, visit with their neighbors, or engage in activities which disrupt the work of others. In spite of the relatively high frequency of such inappropriate behavior, first and second grade children regularly are required to work independently. This calls for what may be termed task-oriented behavior, i.e., behavior that leads to completing assignments. Task-oriented behavior includes all those activities the child performs to finish his work. The practice of grouping children assumes that while the teacher is busy with one group, pupils in the other groups will be oriented toward completing their tasks. But in view of the difficulty some children have in maintaining attention on learning tasks, what justification is there for grouping?

The necessity for grouping stems from the wide variability in pupil readiness for learning. As Cook (1948) has observed, grouping must be provided on the basis of intellectual status and needs in specific learning areas. Grouping is used in arithmetic as well as the many language activities of reading, written expression, verbal communication, dramatization and others. For purposes of grouping, the school hour is usually divided into three 20-minute sessions. Ordinarily, while one group receives direct instruction, a second is preparing to meet with the teacher, and a third is engaged in follow-up activities. Consequently, each child in the class spends approximately forty minutes of the hour at his desk in preparation or review activities. Usually two hours or more each day is devoted to subject areas which require the application of grouping procedures. For pupils with a limited ability to sustain attention, every school day presents challenges which contain high probabilities of failure.

The problem presented by the inattentive child may at first sight appear deceptively simple. Typical responses might be, "Why not just insist on his going back to work?", or, "If his attention wanders from the task and he begins to bother others, why not remind him that his work isn't finished?" Unfortunately such easy solutions do not seem to produce the desired results.

Several immediate and long-range consequences can be identified which mark the problem of the inattentive child as one of major significance. The most serious consequence is that inappropriate behaviors are highly communicable, and thus an entire class may learn poor work habits from one influential child. In addition, the work of the entire class is interrupted each time the teacher leaves her group to attend to those behaving inappropriately. While loss of continuity of thought appears to be the chief danger, there are more detrimental factors at work affecting the individual child, the other pupils in the class, and the teacher.

Problems for the Individual Child. The child who is unable to sustain attention to learning tasks is at a considerable disadvantage in a classroom. The intermittent nature of his task behavior must produce a result not unlike a television demonstration which is constantly turned off and on by a defective switch. The chain of continuity from one idea to the next is broken. The inattentive child may fall behind his classmates in understanding the subjects presented. The pupil's discouragement and growing confusion with assignments are the immediate outcome of this pattern of non-attention.

Considerable evidence has been accumulated suggesting that most learning problems are of a long-term nature. Their roots can often be traced to the elementary grades. In a study of boys possessing above average intelligence but failing to make adequate high school records, Shaw (1960) found that these youngsters had learning problems as early as the first and second grades. Dillon (1949) observed that many dropouts have the intellectual ability to profit from a full high school program and recommended that guidance service be provided in the elementary school. Lichter (1962), studying high school dropouts with IQs of 90 and higher, found that three-fourths of the boys had academic problems in grammar school. In a study conducted by the U.S. Office of Education, a comparison was made between students who graduated from high school and those who dropped out before graduation. While 23 per cent of those who completed high school had had difficulties in the first grade, the percentage rose to 99.2 among the dropouts.

Society places high values on school achievement and the acquisition of social skills. In order to attain socially acceptable rewards in childhood and at maturity, the individual must meet the academic and social demands of the society in which he lives. Unless the elementary school child can be helped to learn behaviors appropriate to his culture, he will probably find other ways, damaging to both himself and others, of achieving these economic and material goals (Cloward and Ohlin, 1960).

A second and no less serious problem for the non-attentive child is the deteriorating relationship with his teacher. As the pattern of inattention and inappropriate behavior continues, the frequency and intensity of punishment administered by the teacher is apt to increase proportionately. This may have two ill effects. One, the emotional response of the child to punishing stimuli may generalize to an avoidance of the teacher as a punishing agent. An avoidance of the teacher would further reduce the possibility of the child receiving needed instruction. Two, extreme emotional arousal reduces the child's task-orienting behaviors. That is, under stress, the child either attends to too many irrelevant cues or overlooks cues necessary for performing a task (Bindra, 1959).

With the teacher's increasing use of aversive methods and the child's increased avoidance and/or emotionality, it seems likely that the inattentive child's problem will worsen. In addition to the problems already cited, the inattentive child may also suffer the reputation of a troublemaker, fail to develop his intellectual and social potentialities, and in time, develop more serious behavior problems.

Problems for the Class. The teacher who assigns independent work implies that appropriate attending behavior will be rewarded and inappropriate behavior will not. In practice, however, the notice his classmates give to his disruptive behavior may actually reward the misbehaving child, reversing the pattern which the teacher wishes to maintain. When inappropriate behavior is followed immediately by peer recognition, such behavior can be expected to increase. In the light of studies of modeling, other children can be expected to imitate or improvise similar patterns of misbehavior, with these results: (1) The child witnessing inappropriate behavior may acquire responses which previously were not in his repertoire (Bandura and Walters, 1963). (2) Pupils who observe prohibited behavior may tend to imitate that behavior if the models have been rewarded or only weakly punished. What happens to the model as a result of his misbehavior may determine whether already learned inappropriate responses will be inhibited (Walters, Leat, and Mezei, 1963). (3) The observation of a model may produce an increase in a whole class of responses, only a few of which were like the model's behavior. Bandura, Ross and Ross (1961) found, for example, that boys exhibited a broad array of aggressive behaviors when exposed to an aggressive model.

Problems for the Teacher. In order to reduce the immediate threat to the class, the teacher must interrupt her instructional efforts and divert her attention individually to those creating a disturbance. Possibly the greatest hazard to the teacher occurs in what might be called "reversed shaping." That is, the pupil's ready obedience to her harsh commands may lead the teacher to employ increasingly more punitive methods. The response chain can be illustrated as follows. Coercive or angry reminders usually result in the immediate improvement of pupil behaviors. For example, the pupil returns to his seat when the teacher speaks sharply and orders him to do so. Because the child responds immediately, the teacher is reinforced for speaking sharply, and, according to a learning model (Holland and Skinner, 1961), the teacher can be expected to make increasing use of aversive methods under similar conditions in the future. The effectiveness of punishing stimuli tends to diminish with use (Holland and Skinner, 1961). Realizing that her sharp tone of voice has lost some of its effectiveness, the teacher may feel compelled to gradually increase the intensity of her commands.

Hoffman (1960) found that children's use of assertive techniques was associated with similar patterns in the parents' behavior. These power tactics were applied by children to their peers and in resisting attempts by adults to influence them. The teacher who must regulate idle or disruptive behaviors has several alternative methods at her disposal. Most of these involve the use of punishment, interrupting the on-going lesson, and risking an open conflict with the misbehaving child. As might be expected, the typical response is to admonish those responsible for the interruption and remind them to return to their tasks. Teachers report, however, that interruptions continue in spite of after-school talks and other more punitive measures. Eventually, referral is made for psychological assistance in resolving the problem.

What are the implications in the making of a referral to a school psychologist, and in what ways does his specialized knowledge contribute to the resolution of the problems presented by the inattentive child?

The School Psychologist and the Consultation Role

Among the many responsibilities of the school psychologist summarized in a document entitled The Psychologist on the School Staff (APA, 1958) that of "consulting with teachers and administrators on matters of teaching method to enhance pupil adjustment" is rapidly becoming the service most often requested by teachers and administrators. The growing demand for consultation may stem from the following advantages of this service. Such consultation not only can improve pupil learning but can increase the ability of the classroom teacher to recognize and resolve behavior problems (Savage, 1959; Bower, 1961). The goal of consultation is to help the teacher, parent, or others to perform their functions fully and effectively. Consultation stands in direct contrast to the more common psychotherapeutic role in which the psychologist assumes full responsibility for the treatment of the referred child. In the same way that the teacher arranges the classroom to promote learning, the consultant attempts to identify classroom conditions responsible for maintaining misbehavior and to recommend changes that might lead to an increase in more desirable behaviors. Through his knowledge of the learning process, the school psychologist assists the teacher to improve the learning opportunities for all children. As Michael and Meyerson (1962) have stated, "A behavioral approach to counseling and guidance does not consist of a bag of tricks to be applied mechanically for the purpose of coercing unwilling people. It is part of an highly technical system, based on laboratory investigations of the phenomena of conditioning, for describing behavior and specifying the conditions under which it is acquired, maintained, and eliminated" (p. 382).

This study was designed from the point of view of the school psychologist who, with the teacher, seeks to increase the task-oriented and attending responses of school children.

The limited capacity of a few children to sustain attention to their work frequently leads to conditions which interfere with the learning activities of other children. The application of aversive methods in either controlling or improving learning behavior has serious disadvantages. Thus, other techniques which could increase the rate of task-oriented behaviors of children were examined. The literature on social learning theory which has generated a number of promising techniques was given special attention along with the literature on other related topics.

Related Research on Attention

The concept of attention has undergone extensive investigation and development since William James (1896) identified the individual's interest as the chief determinant influencing attention. In a review of theories relating to attention, Paschel (1941) found that the term "attention" dropped from use during the 1920's. It was replaced by the more observable "orienting response." More recently, Berlyne (1960) considered attention as a two-part process: (1) inhibiting responses to distracting stimuli, and (2) increasing in intensity the response to the stimulus upon which attention is being focused. That is, once attention has been focused upon a particular stimulus, the potentials evoked by that stimulus are increased. Extensive research has been conducted to explore the processes through which some stimuli come to evoke high attention whereas the potency of others may be reduced or even eliminated. These findings are relevant to the present examination of inattention in second grade children. Reduction of intensity of distracting stimuli occurs in two ways. Most common perhaps is habituation. In physiological terms, habituation is that process through which a stimulus ceases to produce a desynchronization of the EEG after repeated presentations. In behavioral terms, habituation refers to the gradual adaptation of an organism to environmental stimuli (Holland and Skinner, 1961). Habituation, however, is only one part of the "shutting out" process. The same effect is observed when more powerful stimuli enter the attentional field of the individual. Berlyne (1960), for example, reported a study by Jouvet (1957) performed on human subjects. In this study, electrodes were implanted to record electroencephalographic responses to flashes of light. These light-produced responses remained at a constant level until the subject oriented his attention to other stimuli, such as a conversation with the experimenter. At that time, the electrical potentials associated with the flashing light were sharply diminished or extinguished altogether.

Stimuli are reduced or eliminated either by habituation or by the presence of more powerful competing stimuli. The capability of otherwise neutral stimuli to acquire positive reinforcing qualities through conditioning has been well established (Walter, 1958; Solley and Sommer, 1957; John and Killam, 1960). These studies provide a model of the process through which a stimulus can become intensified through operant and classical conditioning procedures.

Whereas Berlyne's analysis of attention centered on changes in the capability of the stimulus to evoke a response, the present investigation was more concerned with changes in the frequency of a particular response. Berlyne identified intensification of stimuli as one side of the attentional process and the habituation of competing stimuli as the other. The analogs in an operant conditioning model are those of reinforcement and extinction. Thus, increasing task orientation is conceived as the result of reinforcing task-oriented behaviors and extinguishing behaviors incompatible with task orientation.

Additional factors are associated with providing positive reinforcement. Repeated reinforcement of task-oriented behaviors may result in the performance of tasks acquiring positive reinforcing qualities of their own. A second outcome may be that pupils reinforced for the performance of tasks will discover rewards associated with understanding new concepts and coming in contact with the thoughts of others. This outcome is consistent with Pribram's (1964) view of the contribution and meaning of reinforcement, namely, that it serves to remind the individual of the intrinsic value of an activity itself. Social reinforcement is seldom a permanent element in the continuing performance of most activities. The individual in his performance of the activity usually becomes fully self-reinforcing.

The desired outcome following social reinforcement procedures in this study was the reduction of responses to distractor stimuli in the presence of task-relevant competing stimuli. It was anticipated that a gradual increase in the secondary reinforcing properties of task behaviors would override or suppress the effect of weaker, habituated distractor stimuli.

Reported Applications of Operant-Learning Methods in the Modification of Pupil Behavior

In order to translate learning principles for the classroom, second grade teachers in the experimental group of the present study were trained to apply certain reinforcement procedures. Other studies have reported the use of similar procedures. Williams (1959) instructed parents in methods designed to extinguish tantrum behavior. Ayllon and Michael (1959) trained psychiatric nurses to extinguish unwanted verbal responses in hospitalized psychotics. In other investigations, maladaptive behaviors of autistic children were modified by ward attendants and parents who received instruction and supervision from consultants (Wolf, Risley, and Meese, 1964); and a child diagnosed variously as pre-psychotic, brain-injured and severely disturbed was treated by a therapeutic program which included the retraining of the parent (Russo, 1964). Russo gathered information on the manner of the child's tantrum behavior and the mother's response. It became apparent that the child's inappropriate behavior was being maintained, in part, by the mother's use of force to control her child's emotional outbursts. Although explicit instructions had been given the mother regarding the desirability of not reacting in this manner, the conflicts continued. Since it was apparent that the mother could not alter her own behavior without further assistance, she was invited to the clinic with her child to commence treatment together. During these sessions the therapist initially acted as the parent and later the mother gradually performed the role previously taken by the therapist.

> When Mike played in an approved manner, his mother enthusiastically participated in the activity. When he broke the rules, she ignored him as planned, smoked a cigarette, turned her back on him and engaged the therapist in conversation, played a game with the therapist, or started a project of her own. Thus only socially approved conduct was reinforced. This brought on violent language, criticism, and stormy sessions, but eventually he learned to behave to get his mother's company and approval. Occasionally the therapist commented on activity in progress (p. 45).

Another study which had greater relevance to the present investigation was that of Bijou (1964). The purpose of the experiment was to train a parent to ignore the unwanted acts and to reinforce the cooperative behaviors of her child. The procedures used in training were outlined as ". . . (1) describing and giving examples of commanding and cooperating behaviors, (2) giving instructions on how to react to each class of behaviors, (3) holding sessions in which she (the parent) decides which form of behavior is being displayed, and having her react accordingly. (If it is commanding, ignore; if it is cooperating, reinforce)" (p. 5).

Davidson (1964) employed techniques similar to those of Bijou (1964) in training undergraduates as social reinforcers. The steps followed by Davidson stressed familiarity with operant conditioning methods, developing awareness of the influence of environmental contingencies, and finally using role playing techniques to enable the trainees to gain proficiency in applying the recommended reinforcement methods.

A series of investigations was carried out to determine the effects of differing schedules of reinforcement under conditions of spaced and massed practice (Mech, Hurst, Auble and Fattu, 1953; Kapos, Mech and Fox, 1957). Mech and his associates (1953) studied the performance of fourth grade pupils in the acquisition of a computational skill in response to different reinforcement schedules applied by their classroom teachers. Their findings reported that, under conditions of massed practice, pupils demonstrated the greatest resistance to extinction when they had been continuously reinforced, rather than reinforced intermittently or not at all. The author's explanation for this surprising result was that the learning of a new skill such as that acquired in this study required a higher frequency of reinforcement. Information was not presented on the degree to which teachers conformed to the experimental conditions of reinforcement frequency, although experimenter supervision of teachers was mentioned. Two distinctions must be noted between the studies reported by Mech and Kapos and the present investigation. First, in the Mech study, a specific arithmetic technique was defined as the behavior to be reinforced. In the present study, a broad class of task behaviors was the dependent variable. Second, in the Mech study, application of schedules of reinforcement was confined to limited periods of time during which massed and spaced practice was provided. In the present study, teachers were asked to apply reinforcement procedures throughout the day for several weeks.

Positive Reinforcement

The presenting of a positive reinforcer contingent upon a response is called a positive reinforcement. Though not all children are responsive to social rewards (Cairns, 1961), the teacher's recognition (by a smile, compliment, etc.) has been assumed to be a positive reinforcer in the present study.

The study of greatest relevance to the present investigation was Patterson's case study (1964) in which he used reinforcement to increase attending behaviors. His report "describes a technique for controlling the behavior of a hyperactive child in the classroom setting. Social and non-social reinforcers were used to increase the rate of occurrence of a broad class of behaviors appropriate to the classroom setting" (p. 1). Patterson used a fixed interval schedule, dispensing one M & M candy or a penny for each ten seconds that Earl, the child, engaged in appropriate behavior. An electronic counter was placed on Earl's desk so that he could keep track of his earnings during the conditioning trials. The social approval of his peers, though not under control, was liberally present and served as an added reinforcement.

> For example, at the end of each conditioning session when the score was announced to the class (representing the length of time the child had engaged in appropriate behavior), they would typically applaud Earl for his performance earnings. They also frequently walked by his desk and peered at the counter to see how well he was doing. During breaks in the classroom routine, for example, at recess, the experimenters overheard frequent comments such as "You sure are doing good, you get better every day" (p. 7).

Patterson noted, "There seems little reason to deny that these social reinforcers had some effect; in fact, the procedure was structured in such a way as to maximize the possibility of their occurrence" (p. 7). The dependent variable was identified as the number of hyperactive behaviors observed per minute. Results at the end of the study revealed an average drop of 8.4 responses per minute, a difference which was significant at p less than the .01 level.

Although case study evidence can only be suggestive, the significance of Patterson's study lies in the demonstration that classroom behavior can possibly be changed in desirable ways and that the efficacy of positive reinforcement seems supported. Patterson (1964) observed that the relative strength of a response to distractor stimuli can be reduced by making reinforcement contingent upon the occurrence of desirable responses. The importance of a very short latency between desirable responses and reinforcing stimuli was also stressed.

Non-reward

As a treatment strategy, non-reward was used to extinguish responses incompatible with task orientation. If such non-task oriented responses previously gained a variety of teacher-dispensed reinforcers, e.g., reminders, repetitions of the day's assignment, etc., the withholding of these reinforcers would probably result in an initial increase of those undesirable responses (Holton, 1961). However, if desirable behaviors also resulted in teacher reinforcement, then they could be expected to show a similar increase in rate following the commencement of extinction procedures for the undesired responses (Penny, 1960). The extinction of deviant responses, by itself, seldom produces better social or learning behavior. Provision must also be made for the learning of the desired social and academic skills.

Isolation of Subjects Behaving Disruptively

In view of Patterson's observation regarding the possible effect of peer group reinforcement, teachers were given specific instructions to prevent peer reinforcement when subjects began to behave disruptively. The objective of these instructions was to insure that conditions of non-reward would be maintained for disruptive behaviors. Three rules were provided teachers as guidelines.

1. Disregard the child when he is not paying attention.
2. If the subject's behavior disrupts the learning activities of others,
    a. Continue to disregard him (if the interruption appears to be brief) or
    b. Warn him that if he continues to misbehave, he will be removed from the classroom.
3. Ask the child to leave if the disruptive behavior continues.

The steps taken to limit peer reinforcement of disruptive behaviors were those of disregarding or isolating the subject. The use of non-reward and isolation, however, may have resulted in an increased susceptibility to reinforcement.

Susceptibility to Reinforcement

An increase in the conditionability of Ss has been found to result from isolation (Gewirtz and Baer, 1959). Anxiety has also been increased by isolation (Walters, Marshall, and Shooter, 1960). Individuals who possessed well-established dependency habits (Baer, 1962), and pupils who frequently asked for help with tasks they could perform for themselves (Jakubczak and Walters, 1959) were found to be more suggestible than low-anxious children. In view of these findings, strong conditioning effects were anticipated from the selection and treatment procedures used in the present study. The use of isolation with "dependent" children would be expected to increase the potency of social reinforcers.

Summary

Studies have been summarized which have shown that (1) Berlyne's model of the attentional process has been supported by neurophysiological evidence, (2) a variety of lay persons has been able to learn reinforcement procedures which have been effective in modifying behavior, (3) reinforcement procedures have been successfully applied in a case study to increase task-oriented behavior, and (4) the conditionability of Ss is influenced by isolation and is a factor in the possible effectiveness of reinforcement procedures.

The effectiveness of reinforcement procedures has yet to be experimentally demonstrated in a naturalistic setting in modifying task-oriented behaviors.

CHAPTER II

EXPERIMENTAL DESIGN AND PROCEDURE

Introduction and Overview of the Study

The mounting evidence of the effectiveness of social reinforcement methods for changing behavior has yet to be demonstrated in the elementary school classroom. Yet, the most widespread use of these techniques might be expected to occur in precisely that setting. This study was designed to measure the effect of reinforcement on one general class of behaviors, that of task orientation.

The value of identifying task orientation as the dependent variable is underlined by the crucial relationship of attending behaviors to the whole learning process. Only when youngsters are able to sustain attention to learning tasks are they likely to acquire any of the highly necessary social and academic skills.

A total of 28 second grade boys and 14 teachers from seven schools in the San Carlos Elementary School District participated in this study. Each teacher selected four children in her class who had difficulty in sustaining attention, and of these, two were chosen as subjects. The remaining two were not included in the experiment. Of the first two selected one was identified to the teacher as being the subject who would be observed periodically and would be receiving the experimental or control treatment procedures. The second child remained unidentified to the teacher as a subject while undergoing similar observation.

Task-oriented behavior by pupils was the terminal dependent variable. It was measured by use of the Problem Behavior Checklist (PBC), and the Task Orientation Observation Schedule (TOOS). The PBC was a descriptive rating scale comprising 39 behavioral descriptions and was completed by teachers before and after application of the experimental procedure. The TOOS was used before, during, and after the experimental procedure and consisted of an observation technique for recording pupil and teacher behaviors simultaneously. In order to test its reliability and accuracy the TOOS was subjected to a pilot study.

The intermediate dependent variable was the degree to which teachers actually applied the reinforcement model. The criterion measure for teacher behavior was a part of the TOOS.

A two-phase hypothesis was examined. First, it was hypothesized that the behavior of teachers trained in operant techniques would show greater application of reinforcement methods than control group teachers. The second-phase hypotheses predicted certain changes in pupil task-oriented behavior as the result of teachers using the reinforcement methods.

An analysis of covariance design was used to evaluate changes in pupil behavior, while an analysis of variance was used to measure differences between teacher behavior in the experimental and control groups.

General purpose. The main purpose of this study was to measure the effect of instructing teachers in social reinforcement procedures to increase task-oriented behaviors of certain inattentive elementary school children.

Specific purpose. The specific purpose of this investigation was to measure the effect of instructing teachers in these methods under two conditions: (1) the teacher was asked to apply experimental procedures to a particular child in the room; and (2) a second child in the same classroom was not identified to the teacher but was observed for possible transfer effects. This same procedure was applied to the control group. Thus, the four groups were as follows:

a. Children identified to the teacher as the subject and receiving the experimental treatment (EId).

b. Children not identified to the teacher as subjects but being present in a class assigned as experimental (ENId).

c. Children in the control group and identified to the teacher as subjects (Id).

d. Children in the control group and not identified to the teacher as subjects (CNId).

TABLE 1

NUMBER OF SUBJECTS IN EACH CELL OF THE EXPERIMENTAL DESIGN

	Children identified to teachers as subjects	Children not identified to the teachers as subjects	Total
Experimental Groups	EId N=7	ENId N=7	14
Control Groups	CId N=7	CNId N=7	14
Total	14	14	28

The comparison of children identified and not identified to the teacher served a combined purpose. Rosenthal (1963) has demonstrated the pervasive effects of experimenter bias. That is, experimenters tend to obtain the data they want from experimental procedures. Since teachers were responsible for manipulations of the experimental variable, their expectation of improved behavior could conceivably affect the outcome. A second child in each classroom was observed without the teacher's awareness to permit a comparison of effects which would be unbiased. Thus, if group ENId as well as EId showed gains significantly greater than CId or CNId, one would have to conclude that the experimental treatment, rather than experimenter bias, was at work in the production of the difference.

This procedure was also designed to indicate the degree to which teachers generalized the experimental procedure to other children. Although teachers were expected to conform to the conditions of the experiment in handling the identified children, they were not specifically asked or urged to apply the experimental techniques with others in the class.

A complex design having many features of the medical "double blind" experiment was employed in order to eliminate or reduce possible bias in results. The control group teachers were led to think that they were an object of special attention. Thus the control group must be regarded as a "placebo" group rather than an inactive control group. Some subjects were not identified to teachers as Ss but were observed without the teacher's knowledge. Further, the observers who collected the criterion data were not informed about the experimental treatments or the membership of subjects in the various treatment groups.

First Phase Hypotheses

1. Teachers trained in the application of the reinforcement techniques will make greater use of those techniques than will teachers not receiving such training.
2. Teachers in the experimental group will make more frequent use of reinforcement techniques with pupils identified as Ss than with non-identified Ss.

Second Phase Hypotheses

1. Children having low rates of task-oriented behaviors will devote more time to task activities after working with teachers trained in reinforcement methods than children whose teachers have not been so trained.
2. Children having low rates of task-oriented behaviors will devote more time to task activities when they have been identified to their teachers as subjects than when they have not been identified as subjects.
3. There will be no interaction effect between treatment and identification status on time devoted to task activities.
4. Children having low rates of task-oriented behaviors will show greater independence in task completion after working with teachers trained in reinforcement methods than children whose teachers have not been so trained.
5. Children having low rates of task-oriented behaviors will show greater independence in task completion when they have been identified to their teachers as subjects than when they have not been identified as subjects.
6. There will be no interaction effect between treatment and identification status on independence in task completion.

7. Children having low rates of task-oriented behaviors will be rated as having fewer problem behaviors after working with teachers trained in reinforcement methods than children whose teachers have not been so trained.
8. Children having low rates of task-oriented behaviors will be rated as having fewer problem behaviors when they have been identified to their teachers as subjects than when they have not been identified as subjects.
9. There will be no interaction effect between treatment and identification status on number of rated problem behaviors.

Teachers

Description

Fourteen of the sixteen second grade teachers in San Carlos Elementary Schools participated in this experiment. All fourteen teachers were fully credentialed.

Before the project began, all the second grade teachers in the district were invited to attend an orientation meeting. At this time, the general purpose of the study was explained as an attempt to find methods effective in helping the inattentive child. The teachers' cooperation was solicited. (See Appendix A.) Time demands and the necessity to maintain confidentiality regarding methods used during the six-week period were made clear. Those teachers indicating a willingness to participate were asked to remain; the others were permitted to leave. Two of the sixteen teachers declined to participate. Any generalizations from this investigation, therefore, must be confined to a population of teachers who volunteered to participate in research.

Teachers were assigned randomly to experimental and control groups. When two teachers from the same school agreed to participate, one was randomly designated as experimental and the other became control. The teachers were told they had been assigned to one of two groups and were given the impression that both groups would be applying certain methods which were being tested for their effectiveness in improving attending behavior. It was stressed that there should be no discussion with other groups about methodology, problems arising in the classroom, or other matters relating to research, as such interaction might dilute the purity of the experiment and make the findings less useful.

Training of Teachers--Experimental Group

A week after the orientation meeting, teachers who had been randomly assigned to the experimental group met with the experimenter to familiarize themselves with the proposed procedures. The agenda for the meeting included (1) informing the teachers of the names of the children who had been "selected as subjects" (group EId), (2) a review of the purposes of the study (see Appendix A), (3) explaining the methods to be used (see Appendix B). By way of introduction, the purposes of the study were explained and the rationale given. To illustrate the techniques, the study by Patterson (1964) and a nursery school investigation by Allen (1965) were briefly described. The latter study was particularly relevant in that nursery school teachers had been used as reinforcement agents. In order to provide a clear illustration of the behaviors related to task orientation, a short film prepared by the experimenter was shown. Periodically, the film was stopped to call attention to specific pupil behaviors that teachers would be expected to reinforce. The rest of the meeting was devoted to questions from individual teachers about how this method might be used in the classroom. As it appeared that the questions were highly specific, arrangements were made to meet with each teacher individually at her school so that specific questions could receive attention.

After the initial meeting, each teacher conferred with the experimenter, twice individually and once in a group meeting. Each time, emphasis was placed on the importance of conforming to the operant model. (See Appendix C.) The most frequently expressed concern was the difficulty teachers experienced in disregarding the inattentive behavior of pupils. The teachers' tendency to remind pupils to resume work was persistent despite the teachers' awareness that these reminders might serve only to reinforce inattentive behavior.

Teachers were informed that observers would be visiting their classrooms periodically and that every effort should be made to ignore their presence and activities. The method of observation, the behavior being observed, and the recording form were explained thoroughly to the teachers in both experimental and control groups (save for the concealed observation of non-identified Ss).

Training of Teachers--Control Group

After the orientation meeting in which all teachers were given an explanation of the general purposes of the study, a meeting was held with the teachers assigned to the control group. The agenda for that meeting included (1) the identification of children who were to be subjects, (2) the completion of a teaching-method questionnaire, and (3) a general discussion of problems concerning the inattentive pupil. Before the discussion, each teacher was given a "Survey of Teaching Methods" questionnaire. (See Appendix D.) This survey requested the teacher to indicate methods she had found to be effective in dealing with specified attentional problems. Specific areas discussed at the meeting included possible causes of inattention, the variety of attentional problems teachers encounter, and a review of techniques. The fact that teachers had different approaches was pointed to as an indication that each teacher had found methods compatible with her personality and that it would be most appropriate for her to pursue these same techniques during the following six-week period. In the course of this meeting, teachers were informed that observers would be visiting their classrooms periodically to evaluate the effectiveness of their particular techniques in the classroom.

Within a week, each of the teachers in the control group received a typed copy of her answers to the "Survey of Teaching Methods" questionnaire with a note urging her to follow these techniques carefully during the course of the study. Conferences with the experimenter were planned and executed for both control and experimental group teachers.

Observers

Selection

Observers were selected from women active in the Parent-Teacher Association who had expressed interest in participating in a research project to be conducted within the district. Although each of the observers finally selected had had children enrolled in the San Carlos schools at one time or another, none had any of her own children in the classes to which she was assigned.

Factors used in selecting observers included the availability of time and the willingness to observe for a nominal fee. Of the seven mothers who had volunteered, three remained after the final screening, and these women continued to serve throughout the study.

Training of Observers

This training program included a discussion of the various behaviors to be observed, film clips illustrating these behaviors, and a rating of actions depicted in the training film itself to determine the proficiency of the observers in making the desired ratings. Observers were not informed about the nature of the experiment on reinforcement or the assignment of teachers to the control or experimental groups. They were requested not to discuss any element of the study with the teachers. If questions arose, they were to be directed only to the experimenter or to other observers.

The observers then visited the classrooms to which they would be assigned. This served the dual purpose of helping Ss adapt to the presence of observers in the classroom and the observers to acclimatize themselves to the surroundings. To develop proficiency in the use of the observational schedule and equipment, the observers made ratings on children selected by the experimenter at random. Initially observers were assigned to observe together so that they could familiarize themselves with categories of teacher or pupil behavior upon which agreement was most difficult. The procedures used to determine inter-observer reliability are described in the section on the measurement of the dependent variable.

After reaching a sufficient standard of inter-observer agreement the observers were assigned individually to classrooms to collect baserate or pretest measures of pupil behavior.

Each observer had her own schedule. Table 2 illustrates the manner in which one observer was assigned to classes and pupils for the baserate measures. For mid-study and posttest ratings, each child was observed for a total of 90 minutes during three days. Each observer made the same number of observations on experimental classrooms as on control classrooms.

TABLE 2

SCHEDULE OF PRETEST OBSERVATIONS FOR ONE OBSERVER

Day	School	Teacher	Pupil	8:40-9:30	9:50-10:30
Tues.	Arundel	Pa	4	X	
Tues.	Arundel	Pa	3	X	
Tues.	Arundel	Mc	1		X
Tues.	Arundel	Mc	2		X
Wed.	T. L.	Ma	18	X	
Wed.	T. L.	Ma	17	X	
Wed.	T. L.	El	19		X
Wed.	T. L.	El	20		X
Thurs.	C.	Gi	15	X	
Thurs.	C.	Gi	16	X	
Thurs.	H.	De	13		X
Thurs.	H.	De	14		X
Fri.	Arundel	Mc	1	X	
Fri.	Arundel	Mc	2	X	
Fri.	Arundel	Pa	4		X
Fri.	Arundel	Pa	3		X
Mon.	T. L.	El	19	X	
Mon.	T. L.	El	20	X	
Mon.	T. L.	Ma	18		X
Mon.	T. L.	Ma	17		X
Tues.	H.	De	13	X	
Tues.	H.	De	14	X	
Tues.	C.	Gi	15		X
Tues.	C.	Gi	16		X

Treatment Procedures

The Reinforcement Model

The reinforcement model applied by teachers was based on concepts developed by Skinner (1953). The underlying principle in operant conditioning is that the frequency of a particular behavior is influenced by the consequences of previous, similar behaviors in the presence of similar stimuli. That is, within the operant paradigm, the behavior of interest must occur before reinforcement can be applied. In the context of a classroom, the teacher performs both in response to the behavior of children and the demands of the course of study. For example, a teacher assembles the children for a reading lesson in order to provide instruction (a non-reactive teacher behavior), but may compliment a pupil for his contribution to a discussion (a reactive behavior). The reinforcement model represents a set of reactive behaviors for teachers to specific pupil responses. The model is designed to increase the frequency of task-oriented behaviors and diminish the frequency of non-attentive behaviors.

Classroom routines remained unchanged during the observational periods. Most of the time when observers were present, teachers were occupied with giving direct instruction to small groups. "Instructing the group which includes the subject" (category 4), and "disregarding the pupil's behavior" (category 5), were the most common categories of teacher behavior rated on the TOOS. Behavior in categories 4 and 5 on the observation form could not be interpreted as being teacher responses to the subject's behavior.

The matrix in Table 3 illustrates the reinforcement model which teachers in the experimental group were asked to follow. The rows represent nine categories of teacher behavior, and the columns represent five categories of pupil behavior. The pupil behaviors are described in detail later. The categories may be roughly described as (1) working, (2) preparing to work, (3) being idle, (4) disrupting a few other children and (5) disrupting the work of many other pupils. Shaded cells indicate "ideal" teacher behavior according to the model. Minus signs indicate teacher behaviors considered to be incompatible with the operant model. Combinations such as 1-5 (rewarding the child who behaves disruptively) have not been assigned a minus since their occurrence is so improbable.

TABLE 3

REINFORCEMENT MODEL FOR TEACHERS IN THE EXPERIMENTAL GROUP

Pupil Behavior:

1. High task orientation.
2. Task orientation.
3. Neutral behavior.
4. Non-task orientation.
5. Low-task orientation.

Teacher Behavior:		1.	2.	3.	4.	5.
1. Rewarding the individual child.	1.	▨	▨	-		
2. Rewarding the group including the subject.	2.	▨	▨	-		
3. Instructing the subject.	3.	▨	▨	-		
4. Instructing the group including the subject.	4.					
5. Disregarding the pupil's behavior.	5.					
6. Reminding the subject to resume work.	6.	-	-	-	-	-
7. Warning the subject against further misconduct.	7.	-	-		▨	▨
8. Punishing the group in which subject is a member.	8.	-	-	-	-	-
9. Punishing the subject.	9.	-	-	-	-	-

Treatment Groups

Treatment Group EId. The experimental teachers were instructed to apply the operant model to the children identified to them as "subjects." Teachers were cautioned that attempts to use these methods with all children would be difficult and that their main responsibility was to apply these methods to the designated children.

Treatment Group ENId. The non-identified subjects were never distinguished from the remainder of the class in any discussion with the teacher. This enabled observation of the degree to which methods used with the identified child were generalized to another similar pupil.

Treatment Group CId. The control teachers had been asked to identify methods they had found effective in working with inattentive children. These reports were typed and returned to the teachers with the request that they continue to follow these methods as closely as possible with the identified subjects. As with the experimental teachers, it was suggested that these techniques be used consistently with only the identified subjects. With the other children they were free to use their usual methods or any other method they might choose.

Treatment Group CNId. Control teachers and children were observed to determine the degree of transfer of methods and effects from the identified subject to a similarly inattentive but non-identified subject.

Task-Oriented Behavior, the Dependent Variable

Two approaches were followed in the measurement of task-oriented behavior: (1) a judgment of the child's behavior was obtained from the teacher and (2) a direct observation of the pupil's task behavior was made.

Criterion Measures

The Problem Behavior Checklist (PBC)

This survey consisted of 39 behavioral descriptions which are incompatible with task orientation. (See Appendix E.) At the first meeting, each teacher was given four copies of the PBC and asked to complete one copy for each of the four children considered to be most handicapped in his ability to sustain attention to tasks. This procedure was repeated at the conclusion of the study, so that two PBCs were completed for each child.

The PBC was adapted from a longer questionnaire used by the Guidance Office of the Ravenswood Elementary School District for the identification of children who appear to need psychological assistance in learning and/or behavioral adjustment. The PBC was incorporated into this study for two reasons. First, behavioral descriptions listed on the PBC gave teachers a better idea of which behaviors should be considered as non-attentive. Secondly, the PBC provided a standard baseline against which teachers could report judgments about the behavior of their pupils.

Analysis of covariance was applied to posttest comparisons between experimental and control groups for identified and, again, for non-identified subjects. The score on the PBC for a given child consisted of the sum of the teacher's ratings on all of the 39 items. The rating on an individual item was made on a scale from 1 (poor) to 5 (perfect). PBC scores could therefore range from 39 to 195.

The analysis of posttest ratings was made for both the total PBC score and individual item scores. A two by two analysis of covariance for the four groups was computed and augmented by separate comparisons between the control and experimental groups for identified and non-identified subjects. The degree of association between observations of the pupil's behavior on the TOOS and teacher ratings on the PBC was also estimated.

The Task Orientation Observation Schedule (TOOS)

Because of the experimental teachers' relative unfamiliarity with the suggested reinforcement model, it was necessary to determine how closely they followed the model. Therefore, both pupil behavior and teacher behavior represented dependent variables in this two-phase study. Interlocking scales were designed: one was for describing the task-oriented behavior of pupils, and the other was for measuring the degree of teacher conformity to the reinforcement model. The TOOS was designed to measure simultaneously the behavior of both pupil and teacher, so that there could be an evaluation of the relationship between these two dimensions.

Categories of Pupil Behavior. Task-oriented behavior has been defined along a five-point scale. Each of the five levels has been described in terms of specific, non-overlapping behaviors. An effort was made to place the least possible demand upon the observer to infer intent from behavior. The five pupil behaviors are as follows:

1. High task orientation. The child reads, writes, figures, and enters into activities determined by the teacher. This includes information seeking, working at the blackboard or desk, and listening to the teacher. It also includes raising his hand for assistance, participating in committee activity, reading, and other appropriate behavior.

2. Task orientation. The child is preparing for work or is carrying out monitor activities, such as cleaning the sink, passing papers, collecting work, opening the windows, etc.
3. Neutral behavior. This is used where there are too few cues to permit labelling the child's behavior as having low or high task orientation. This category might include sitting quietly, looking into space, finding objects in the desk to play with, rocking back and forth in the chair, adjusting materials on the desk, staring at other children, etc.
4. Non-task orientation. This behavior is incompatible with the child finishing his work and may be disturbing to other children. It includes talking with seatmates, mild horseplay, tapping the desk with the pencil, making random noises, etc. While mildly disruptive, this behavior is not visible or audible in all parts of the room and may or may not result in the disturbance of other children.
5. Low-task orientation. This category is reserved for severely disruptive behavior which meets all the following criteria: (a) it is not compatible with completing the task, (b) it is associated with disruption of the work of others, (c) it is easily visible or audible in all parts of the room, and (d) it is a clear deviation from normal behavior in the room. Examples would include banging a door, dropping large objects on the floor, shouting across the room, and fighting.

In spite of the evident specificity of descriptions, uncertainty was unavoidable, and this set limits to the degree of observer agreement.

For example, preparation for work, such as gathering materials, deteriorates in some cases to an idle shifting of papers and books. Although the two behaviors (preparation and rummaging in the desk) are discernibly different, it is impossible to establish exactly the point at which preparation shifts to neutral behavior.

Scoring methods. The task-oriented behavior of pupils was scored in two ways. First, an average was computed for all the observations of a pupil's behavior (TOOS). Second, the proportion of time the pupil engaged in task-oriented behaviors when his teacher was busy elsewhere was calculated (TOB 5-12). The former provided a simple average rating of the pupil's task-oriented behavior and the latter, a measure of the proportion of time the pupil engaged in independent task activities.

Categories of teacher behavior. Teacher behaviors recommended for increasing task-oriented behaviors of pupils have been described earlier. During their training period, teachers were presented with a reinforcement model which, it was hypothesized, would increase attending behaviors of pupils. A total of nine categories of teacher behavior was developed to assess the teacher's application of the model and to permit a discrimination between teacher actions directed to the subject individually or the group in which the subject was a member:

1. Praises, encourages, and rewards the child being observed.
2. Praises, encourages, and rewards the group in which the subject is a member.
3. Assists the individual child under observation by explanations, review of the assignment, help with a particular problem, etc.
4. Provides assistance, lectures, and discusses with the group in which the subject is a member.

5. No contact. The teacher is occupied elsewhere in the room, and for the time being is disregarding the subject.
6. Reminds the subject to resume work without punitive comment. This may include a reiteration of the assignment but not when solicited by the child. Visuals reminders are included.
7. Warns the subject privately. This may include a threat that continued disruptive behavior will lead to removal from the room.
8. Punishes the group in which the subject is a member.
9. Punishes the subject. This may include embarrassing the child in front of other children, expressing anger to him, etc.

Method of use. An observational schedule was devised to permit the observer to record, with a single mark, the behavior of the teacher and the subject during a five-second interval. The five columns of the rating form represented the five degrees of pupil task orientation, while the rows represented successive five-second intervals of time. The number placed in each cell indicated the behavior of the teacher (using the categories through 9). For example, the first column always indicated high task orientation, e.g., the child sits at his desk calculating a number problem. If at that moment the teacher was busy elsewhere in the classroom and not paying attention to the subject (teacher behavior 5), a "5" would be entered in the first column for that five-second interval. If during the next five-second interval the teacher noticed the subject at work and complimented him on his industry (teacher behavior 1), a "1" would be placed in the first column, second row.

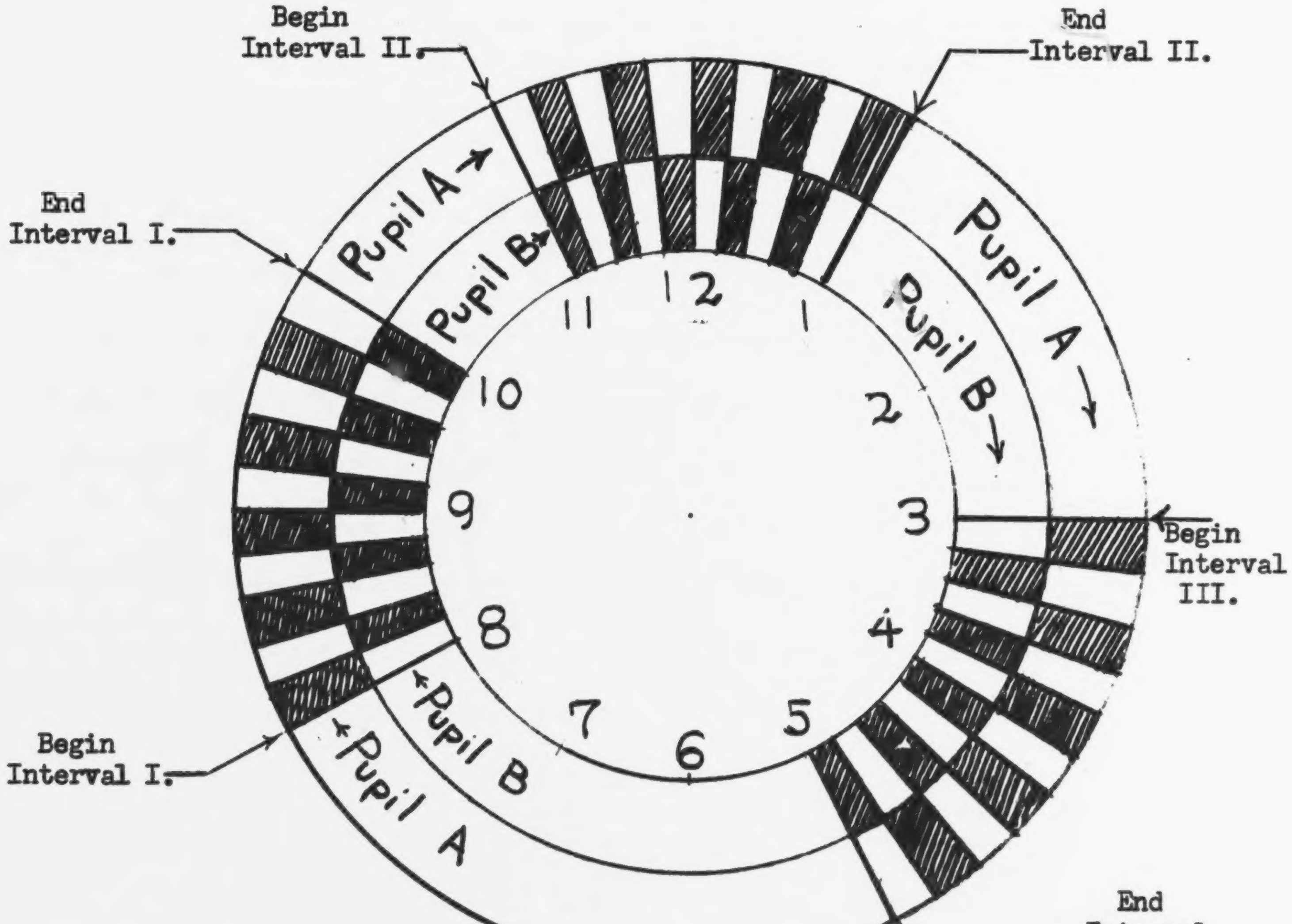
The observation form was divided in half, so that the behavioral ratings of one child were made on the left-hand side of the page, and those of the other child on the right-hand side. A pilot study examination of the TOOS revealed the necessity of increasing the number of observations as well as the span of time during which observations should be sampled. The basic unit of observation was a five-second interval. At the end of that time, a notation was made of both pupil and teacher behavior. Twelve consecutive five-second observations were made, totalling a one-minute period. An interval of observation comprised five of these one-minute units recorded during a ten-minute period of time. Thus, it was possible for the observer to secure an interval of observation on two children within the ten-minute period, by alternately observing one child and then the other, each for one-minute periods. For example, an observer was scheduled to observe two children in a classroom for an hour, starting at 8.40 A.M.; by 9.30 A.M. the observer had recorded three intervals of observation for each child. The following clock chart, shown in Diagram 1, illustrates the recording of ratings on two children, during one hour.

DIAGRAM 1

CLOCK ILLUSTRATION OF TIME DISTRIBUTION FOR RATING TWO CHILDREN FOR THREE INTERVALS

Explanation of chart:

- Shaded areas represent times when the subject is being observed.
- The schedule for pupil A observations is noted in the extreme outer circle.
- Pupil B observations are noted in the adjacent circle.
- Each shaded area represents a one-minute observation.


Begin Interval II.
End Interval II.
End Interval I.
Pupil A →
Pupil B →
Pupil A →
Pupil B →
12
1
2
3
4
5
6
7
8
9
10
11
Begin Interval III.
End Interval III.
Begin Interval I.
← Pupil B
← Pupil A

The five-second signal. Small, portable tape recorders were used by the observers to signal every five seconds. A voice recording of letters A through X was made at five-second intervals. These letter signals, which corresponded to spaces on the observation form, served to remind observers of each five-second unit. The voice recording was made for a sufficiently long period to permit the observer to continue through a 10-minute interval without rotating or rewinding the tape. Earphones were used by the observer to receive the signal. The observers were instructed to place the tape recorders beneath their clip boards during the observational process. Before the start of an observational period, the tape recorders were checked to insure equivalence of speed, clarity of speech, and the adequacy of the batteries.

Reliability Study:

Pilot Study. In order to evaluate the reliability and validity of observations, a pilot study was conducted prior to the outset of the actual study. This was performed in the Ravenswood Elementary School District, with children identified by teachers as either hyperactive, inattentive, or having a short attention span.

Design. The statistical design of the pilot study was adapted from a model presented by Medley and Mitzel (1963), who observed that the common method of simply correlating sets of observations gives little information about the source of error.

> In estimating the reliability coefficient appropriate to any situation, the efficient method is the analysis of variance. Most observational studies in the past have studied reliability either in terms of per cent of observer agreement or in terms of an interclass correlation (usually the product-moment, but occasionally the rank order, coefficient) between two sets of observations.
>
> A per cent of observer agreement tells almost nothing about

> the accuracy of the scores to be used, mainly because the per cent of agreement between observers is relevant to only a part--and, the evidence indicates, a small part at that--of the reliability problem. The experience with observational studies summarized in this chapter clearly bears out a fact pointed out by Barr in 1929; that errors arising from variations in behavior from one situation or occasion to another far outweigh errors arising from failure of two observers to agree exactly in their records of the same behavior. It is not impossible to find observers agreeing 99 per cent in recording behaviors on a scale whose reliability does not differ significantly from zero (p. 310).

Medley and Mitzel (1963) have designed a model for the generation of components of variance from an analysis of variance table. The application of this procedure provides an estimate of the contribution to the total variance of each variable and of its interactions with other variables. Such an analysis further provides a way of detecting the most efficient method for increasing the reliability coefficient. Before the observational instrument was used in the main study, it was subjected to extensive analysis in the pilot study to discover (1) if small differences in pupil behavior could be detected, (2) if one observer could be used instead of two without a significant loss in accuracy and (3) if changes in the variables studied might predictably increase its effectiveness. Thus, the pilot study permitted weaknesses in the design of the instrument to be reduced or eliminated and finally, allowed estimates to be made of its power.

Procedure. Pilot study observations were gathered in the following manner:

1. Six children were selected at random from those who had been referred by their teachers. These six children attended the Belle Haven Elementary School and were enrolled in either the second or third grade. Each child was enrolled in a different classroom. Two

recorders visited each class and made simultaneous observations on each of the six referred children in turn. Each child was observed twice on two separate days.

2. Four weeks later, another pupil was selected at random from each of the classrooms from which the first six children were drawn, and observed similarly. It was hoped that this larger number of pupils would reduce errors due to sampling and would provide a comparison of the performance of "normals" with the "inattentive" children. The analysis was based on a pooling of these data for "normals" with those of the six inattentive pupils.

The strategy for approaching the various analyses was to examine first the major sources of variance in the existing observation schedule, based on a trial run of six pupils. A similar analysis was performed later for the twelve-pupil study.

At the outset of the reliability study, four factors were identified which could contribute to the variability in observations: pupils, observers, days, and intervals during which observations were made. Our initial plan was to observe the subject for four consecutive minutes on two occasions 30 minutes apart. A second series of observations was made on a following day. In this manner, 192 five-second observations were obtained for each of six children. The observers who participated in the pilot study were not the same as those selected later for the main study.

In the computation of the reliability coefficient as the ratio of true-score variance to total variance, the component of variance due to pupils was regarded as true-score variance. Observed-score variance consisted of variance due to pupils together with components related to observers, days, and intervals. The observed variance being estimated is that for an average over observers, days, and intervals.

Six-pupil analysis. In the pilot study of six pupils, a team of two observers looked at each pupil on two days, and at two intervals in each day. Within the interval were 48 separate ratings of momentary behavior. The following table illustrates the mathematical model used in the analysis of components of variance.

TABLE 4

DESIGN FOR RELIABILITY ANALYSIS OF SCORES BASED ON OBSERVATIONS MADE BY r OBSERVERS OF p PUPILS ON d DAYS AND FOR i INTERVALS

Source of Variation	Degrees of Freedom	Obtained Mean Square	Expected Mean Square
1. Pupil	p-1	s_p^2	$rdi\sigma_p^2+di\sigma_{pr}^2+i\sigma_a^2+\sigma^2$
2. Observers	r-1	s_r^2	$pdi\sigma_r^2+di\sigma_{pr}^2+i\sigma_a^2+\sigma^2$
3. P X R	(p-1)(r-1)	s_{pr}^2	$di\sigma_{pr}^2+i\sigma_a^2+\sigma^2$
4. Within P X R (D,PD,RD,PRD)	pr(d-1)	s_a^2	$i\sigma_a^2+\sigma^2$
5. Within P X R X D (I,PI,RI,DI,PRI, PDI,DRI,PRID)	prd(i-1)	s^2	σ^2
Total	prdi-1		

The analysis described by Medley and Mitzel (1963) assumed complete crossing of factors. In the present study, we have intervals confounded with dpr; days nested within pr, and p crossed with r. While an order effect for intervals and days could have been assumed in order to make sense of a crossed analysis, the nested analysis was preferred. For the variables defined above, their number in the pilot study was set as follows: pupils (p = 6), observers (r = 2), days (d = 2), and intervals (i = 2).

A four-way analysis of variance was computed on the data gathered from both pupil and teacher behavior. The analysis for the six-pupil study is presented in Table 5. The rescaling of mean squares by dividing by the number of separate observations for each interval (48) places the magnitude of components within the original scale of five for pupil behaviors.

TABLE 5

ANALYSIS OF VARIANCE OF SCORES BASED ON OBSERVATIONS OF TASK-ORIENTED BEHAVIORS MADE BY TWO OBSERVERS OF SIX PUPILS ON TWO DAYS AND AT TWO INTERVALS

Original			Regrouped		M. S.	Rescaled*	Component
Source of Variation	df	S. S.	d.f.	S. S.			
Pupils	5	64.10	5	64.10	12.82	.267	neg.
Observers	1	.44	1	.44	.44	.009	neg.
pxr	5	3.34	5	3.34	.67	.014	neg.
Days within pr			12	120.40	10.03	.209	neg.
d	1	22.56					
dp	5	94.26					
dr	1	.00					
dpr	5	3.58					
Intervals within dpr			24	495	20.50	.427	.427
i	1	39.58					
di	1	29.34					
pi	5	274.34					
ri	1	.25					
dir	1	.00					
pir	5	.94					
dip	5	152.78					
dipr	5	1.57					

*Mean squares were based upon the sum of 48 separate observations. In order to reduce the mean squares to the original scale of five points, each mean square has been rescaled.

This was a less informative experiment than desired. Because only two observers, two days, and two intervals were included, estimates of some components were undependable. The large component of intervals within dpr (s_w^2/dpr) made all the remaining estimates negative. These components might or might not have very small true values, but small components were expected. The careful design of the rating procedure was intended to make components for observers small. A nonzero, but small component for days was expected. Restricting the study to misbehaving boys reduced the pupil component. A further experiment, not confined to such a restricted range, would probably detect differences between pupils.

The main conclusion from the first analysis was that most error resulted from interval-to-interval variation. With this 2 x 2 x 2 design, the estimated error variance was computed to be .053 and the standard error of measurement (SE_m) near .23. Since the rating scores had a four-point range, it would have been desirable to pin down the pupil component and the average over pupils within groups more precisely. Where six and later nine intervals were used in the main study, we estimate that the error variance and SE_m dropped to .035 and .19, and .025 and .16, respectively.

Twelve-pupil analysis. The second phase of the pilot study included data from observations of twelve pupils including the original six. Again, a team of two observers looked at each child on two days, and at two intervals each day. Table 6 presents an analysis of variance for the twelve-pupil study and an estimation of components of variance.

TABLE 6

ANALYSIS OF VARIANCE OF SCORES OF PUPIL TASK-ORIENTED BEHAVIORS BASED ON OBSERVATIONS MADE BY TWO OBSERVERS ON TWELVE PUPILS ON TWO DAYS AND AT TWO INTERVALS

Original			Regrouped		Mean Squares	Mean Squares Rescaled*	Estimated Components of Variance
Source of Variation	df	S. S.	d.f.	S. S.			
p	11	337.92	11	337.92	30.72	.64	neg.
r	1	.11	1	.11	.11	.002	neg.
pxr	11	7.26	11	7.26	.66	.013	neg.
Days within pr			24	264.64	11.02	.23	.00
d	1	.92					
dp	11	257.62					
dr	1	.21					
drp	11	5.91					
Intervals within dpr			48	730.05	15.20	.317	.32
i	1	1.29					
di	1	1.03					
pi	11	478.00					
ri	1	.33					
dir	1	.33					
pir	11	4.20					
dip	11	240.12					
dipr	11	4.75					

*Mean squares were based upon the sum of 48 separate observations. In order to reduce the mean squares to the original scale of five points, each mean square has been rescaled.

The component for intervals was larger than the others. The estimates for pupils, observers, and pxr, were negative. The component for intervals was smaller than in the six-pupil study, resulting in an estimated error variance of .04 and SE_m of .20.

Baserate analysis of pupil behavior. Information gained from the pilot study was used to modify the observation schedule by (1) increasing the length and number of intervals, and (2) eliminating the second observer. Further evidence on the precision of the revised design was obtained in the baserate study. The new observation schedule was used to get baserate measures of both pupil and teacher behavior for the main study. Analyses of variance were computed for teacher and pupil scores (Tables 7 and 8).

Twenty-eight pupils were observed, each by one observer at any one time. Each pupil was observed on two days, and on three intervals within the day. Within each interval were 60 separate samples of a few seconds each. Since each observer always observed a particular child, observers were confounded with pupils. A nested design therefore was used in the analysis. The estimate of error, though larger than the figure from the pilot study, was regarded as a reasonably satisfactory error against the five-point scale, especially since decisions were to be made about group averages rather than individuals.

TABLE 7

ANALYSIS OF VARIANCE IN BASERATE STUDY: PUPIL TASK ORIENTATION SCORES OF 28 PUPILS ON TWO DAYS AND AT THREE INTERVALS

Original Data			Regrouped Data		Mean Squares	Mean Squares Rescaled	Estimated Components of Variance
Source of Variation	df	S.S.	df	S.S.			
p	27	1148.95	27	1149	42.55	.71	.03
Within p			28	761.72	27.2	.45	.08
d	1	71					
pd	27	691					
Within pd			112	1399.54	12.5	.21	.21
i	2	48					
di	2	1.69					
pi	54	824					
res	54	526					

MS within pd $=\sigma^2_{wpd}$ MS within p $=\sigma^2_{wpd}+\sigma^2_{wp}(n_i)$ $MS_p=\sigma^2_{wpd}+\sigma^2_{wp}(n_i)+\sigma^2_p(n_d n_i)$

$$\sigma^2_e = 1/2\ \sigma^2_{wp} + 1/6\ \sigma^2_{wpd} = .075 \text{ and } \sigma_e = .28$$

The largest error was associated with intervals, i.e., observations separated by 10-minute pauses. There was little systematic day-to-day variability but there was a substantial change in score from one activity to another.

The pupil variance component was small, since these pupils were selected to represent the low-task orientation end of the scale. This technique evidently would not be particularly useful in identifying individual differences *within* the misbehaving group, particularly if treatment were held constant. The variance ratio was computed as .03/(.075 + .03) or .29.

In order to reduce the variance from intervals, the midtest and posttest observations included three additional intervals (by adding a third day's observations). To take these additions into account, the estimate of σ_e^2 was recomputed as follows: $1/3\sigma_{wp}^2 + 1/9\,\sigma_{wpd}^2 = .049$, and $\sigma_e = .22$.

Baserate analysis of teacher behavior. Each of 14 teachers was observed whenever one of the two subjects in her classroom was observed. A single observer made the observation. Data were collected for the teacher-pupil pairs on two days, and on three intervals within the day. The 60 "replications," or moments within the intervals, were ignored in the analysis.

Inasmuch as an observer always observed a particular teacher-pupil combination, observers were confounded with pupils and teachers. The analysis did not treat teacher-pupil pairs separately and thus did not sort out p, t, and p t. Therefore, the component for teachers was regarded as a combination of variance for these three sources. In preparing Table 8, the results of the crossed analysis were regrouped to recognize that intervals were nested within days, and days nested within pupil-teacher pairs.

TABLE 8

ANALYSIS OF VARIANCE IN BASERATE STUDY: TEACHER BEHAVIORS ON TWO DAYS AND AT THREE INTERVALS

Original Data			Regrouped Data		Mean Squares	Mean Squares Rescaled	Estimated Components of Variance
Source of Variation	df	S. S.	d.f.	S. S.		(Div. by 60 repls.)	
tp	27	289.03			10.70	.18	<.01
Within tp			28	258.92	9.25	.15	<.01
d	1	30.12					
td	27	228.80					
Within tpd			112	879.65	7.85	.13	.13
i	2	49.36					
ti	54	468.91					
di	2	3.10					
residual	54	358.28					

EMS within tpd = σ_c^2

EMS within tp = $\sigma_c^2 + n_i\sigma_b^2$

EMS tp = $\sigma_c^2 + n_i n_d \sigma_a^2$

Error = $1/2\ \sigma_b^2 + 1/6\ \sigma_c^2 = .025$

$\sigma_e = .16$

The error variance was small, hence the observation procedure located the teacher very exactly on the five-point scale. Were the appraisal of teacher behavior itself important to the study, information regarding variation within the teacher behavior and between pupils would have been necessary. Of interest in this study was the error in observing teacher-pupil pairs.

The very small component b, "within t p," indicated that teacher behavior was consistent over days. Component c, "within t p d," indicated that there was some inconsistency from one period to another. This was not surprising, however, since classroom activities shift from one 20-minute interval to the next and changes in pupil behavior may evoke different teacher reactions.

The extremely low component for teacher-pupil pairs was consistent with the distribution of scores. Approximately 90 per cent of the teacher behaviors fell into two intermediate categories. Thus, differences between teacher-pupil pairs were very small.

It was concluded that if differences among teachers were introduced by the experimental treatment, the observation procedure was refined enough to detect them. The sensitivity of the procedure, however, is not sufficient to discriminate among untreated teachers responding to inattentive pupils.

Inter-observer agreement. The final step in establishing reliability was the gathering of information about observer agreement. The three observers selected for the main study were assigned in pairs so that each observer would have the opportunity of working with one of the two other observers in turn. Each of the three pairs was assigned to observe six children selected at random in second grade classrooms. From 34 to 40 momentary ratings were made for each child observed. The observers were seated well apart from each other when making their observations. Communication was limited to signaling the start of the observations.

Observers were designated by numbers one, two, and three. Pearson Product-Moment correlations were computed on the ratings of each pair, using the machine computational formula (Walker and Lev, p. 234).

Table 9 presents the correlations for each pair of observers. The N indicates the number of momentary ratings made by each observer pair. The mean represents the average rating for the six pupils observed by any given pair.

TABLE 9

INTERCORRELATIONS OF SCORES ASSIGNED PUPILS
BY PAIRS OF OBSERVERS

Recorder Pairs	N	M_x	M_y	r_{xy}
1 - 2	240	1.34	1.39	.71*
1 - 3	204	1.87	1.92	.74*
2 - 3	236	1.66	1.54	.70*

* = $p < .001$

These coefficients suggest that the observers attained a fairly high and uniform degree of skill in rating the behavior of pupils. The coefficient of about .7 supported the findings of the pilot study that variance due to observers was consistently small. Evidently, it is sources of variance other than observers that limit the reliability of the observation instrument.

Teacher Behavior

Definition

The purposes of this investigation have been defined as determining the effectiveness of certain teacher techniques to increase the frequency of task-oriented behaviors of pupils. These teacher techniques have been defined precisely in a matrix of teacher and pupil behaviors designated as the reinforcement model. A schematic model of this matrix has been described under Treatment Procedures. Although considerable importance has been given to teachers conforming to the reinforcement model, the assumption cannot be made that experimental teachers did follow the model. Teachers' conformity to the model has been designated as a dependent variable in the first phase of this two-phase study.

Variables Affecting Teachers' Conformity to the Reinforcement Model

The training program was designed to present not only the conceptual basis for the reinforcement model, but also to give teachers practice in the discrimination of the various pupil behaviors to be treated in the dimensions of the reinforcement model. Follow-up observations and meetings with the experimenter were arranged to correct misconceptions about the techniques and to encourage adherence to the model. Offsetting these manipulations were the habits learned in years of classroom practice, which may have included the strict reminding of pupils to resume work, coupled with parsimonious praise. Patterson's dictum (1964) regarding the potency of immediate reinforcement in shaping behavior, is called to mind. If the teachers, after giving a sharp command, were to be reinforced by the pupil's immediate obedience, she would be strongly inclined to use sharp commands on future occasions. Furthermore, not using sharp commands might be especially difficult if a teacher had been periodically reinforced for using coercive techniques. The importance of a thorough application of the reinforcement procedures has been underlined by **Spielberger (1962)**, who found that changes in the behavior of subjects was associated with their awareness of changes in the reinforcement contingencies.

Measurement of Teacher Behavior

In the teacher-pupil behavior matrix (Table 3) some cells are shaded, whereas others include a minus sign. A computer program was written which gave the frequencies of the matrix for each pupil-teacher combination. A template or scoring key was constructed to count the entries in cells identified as ideal teacher behavior (shaded cells) and as behavior incompatible with the reinforcement model. Since teachers differ in the frequency of interaction with their pupils, the measure of teacher conformity to the model was defined as an "index" consisting of ideal minus undesirable scores for each teacher-pupil combination. To eliminate negative values for the "index," 10 was added to each remainder. Using index scores, the posttest observations were analyzed to determine the degree of teacher conformity to the model.

CHAPTER III

RESULTS AND DISCUSSION

In this chapter the results are summarized under each hypothesis. The dependent variables have been defined as the task-oriented behavior of second grade pupils and the conformity of teachers to the reinforcement model. The analysis of data sought to determine whether changes in the task-oriented behavior of pupils could be predicted from the teacher's application of specific reinforcement techniques.

Pupil and teacher behavior were measured at the start of the study, three weeks after the treatment began and finally at the end of the six-week treatment period. Mid-study observations were made because a temporary increase in inappropriate behaviors was expected in the experimental group.

Teacher Behavior

Teacher behavior was measured by direct observation using a rating form, the Task Orientation Observation Schedule (TOOS). Since pupil behaviors were rated at the same moment as teacher behaviors, both ratings were tabulated on a single matrix consisting of the 45 possible teacher-pupil combinations. Table 10 on the following two pages presents matrices for the four groups of posttest ratings.

Over 90 per cent of ratings of teachers fell within the two central categories of "instructing the group which includes the subject" and "disregarding the pupil's behavior." Such a restricted range limited

TABLE 10

DISTRIBUTION OF PUPIL-TEACHER BEHAVIOR DURING POSTTEST OBSERVATION FOR IDENTIFIED SUBJECTS (TOOS)*

Experimental Group

Categories of Teacher Behavior	Categories of Pupil Behavior: High-Task Orientation 1	High-Task Orientation 2	Neutral 3	Low-Task Orientation 4	Low-Task Orientation 5	Total	Per Cent
1	17	0	0	0	0	17	.4
2	13	0	3	0	0	16	.4
3	168	10	5	1	0	184	4.9
4	940	119	208	61	23	1351	35.7
5	1258	185	572	156	23	2194	58.1
6	5	4	5	3	1	18	.5
7	0	0	0	0	0	0	.0
8	0	0	0	0	0	0	.0
9	0	0	0	0	0	0	.0
Total	2401	318	793	221	47	3780	100.0
Per Cent	63.6	8.4	20.9	5.9	1.2	100	

Control Group

Categories of Teacher Behavior	Categories of Pupil Behavior: High-Task Orientation 1	High-Task Orientation 2	Neutral 3	Low-Task Orientation 4	Low-Task Orientation 5	Total	Per Cent
1	14	0	0	0	0	14	.4
2	19	0	7	1	0	27	.7
3	98	8	2	0	0	108	2.9
4	1323	104	390	48	3	1868	49.3
5	990	116	496	97	0	1699	45.0
6	7	4	17	8	0	36	1.0
7	0	0	0	0	0	0	.0
8	12	2	4	3	0	21	.5
9	0	0	5	2	0	7	.2
Total	2463	234	921	159	3	3780	100.0
Per Cent	65.3	6.2	24.3	4.2	.1	100.0	

Legend: ☐ = Ideal teacher behavior. ⬚ = Undesirable teacher behavior.

*Each entry represents the sum of five-second ratings falling within a particular teacher-pupil combination.

TABLE 10

DISTRIBUTION OF TEACHER BEHAVIOR DURING POSTTEST OBSERVATION FOR NON-IDENTIFIED SUBJECTS (TOOS)*

Experimental Group

Categories of Teacher Behavior	Categories of Pupil Behavior High-Task Orientation 1	2	Neutral 3	Low-Task Orientation 4	5	Total	Per Cent
1	11	0	0	0	0	11	.3
2	9	0	4	0	0	13	.4
3	73	1	2	0	0	76	2.0
4	959	90	291	59	0	1399	37.0
5	1299	130	615	222	0	2266	60.0
6	1	2	7	3	0	13	.3
7	0	0	0	1	0	1	.0
8	0	0	0	0	0	0	.0
9	0	0	0	1	0	1	.0
Total	2352	223	919	286	0	3780	100
Per Cent	62.2	5.9	24.3	7.6	0	100	

Control Group

Categories of Teacher Behavior	Categories of Pupil Behavior High-Task Orientation 1	2	Neutral 3	Low-Task Orientation 4	5	Total	Per Cent
1	4	0	0	0	0	4	.1
2	15	1	5	0	0	21	.6
3	61	5	6	0	0	72	1.9
4	1193	83	411	49	1	1737	46.0
5	1277	120	457	76	0	1930	51.0
6	1	1	2	0	0	4	.1
7	1	0	0	1	0	2	.0
8	5	0	2	1	0	8	.2
9	0	0	1	1	0	2	.1
Total	2557	210	884	128	1	3780	100
Per Cent	67.6	5.6	23.4	3.4	0	100	

Legend: ☐ = Ideal teacher behavior. ⬚ = Undesirable teacher behavior.

*Each entry represents the sum of the five-second ratings falling within a particular teacher-pupil combination.

the possibility of detecting within-group differences between teachers and made it difficult to correlate teacher ratings with other variables of interest.

Fewer than eight per cent of ratings of pupil behavior fell into categories of mild and severely disruptive behavior. Of the total number of teacher-pupil combinations, less than six per cent fell into cells designated as "ideal" and less than twelve per cent in cells identified as "undesirable." Thus, the teacher-pupil combinations of interest in the study represented only a small fraction of the total activities in the classroom.

Categories of ideal and undesirable teacher behavior are described in Table 11. An index of teacher behavior has been defined as the sum of ideal ratings minus undesirable ratings plus a constant of 10. Table 11 lists the specific behaviors falling under each category and Table 12 lists the ratings for all teachers into these three categories.

TABLE 11

CLASSIFICATION OF TEACHER BEHAVIOR--
IDEAL, NON-IDEAL, AND INDEX

Ideal Behavior Code Teacher	 Pupil	
1	1	Teacher rewards pupil's task behavior individually.
2	1	Teacher rewards group in which subject is a member for task-oriented behavior.
1	2	Teacher rewards pupil's preparatory activity individually.
2	2	Teacher rewards group in which subject is a member for preparatory activity.
3	1	Teacher provides individual attention through instruction to subject engaged in task activities.
3	2	Teacher provides individual attention through instruction to group engaged in preparatory activities in which subject is a member.
7	4	Teacher warns subject behaving disruptively.
7	5	Teacher warns subject behaving very disruptively.
Non-Ideal Behavior		
3	1	Teacher rewards pupil's inattentive behavior individually.
3	2	Teacher rewards group in which pupil is a member for inattentive behavior.
3	3	Teacher provides individual attention through instruction to subject engaged in inattentive behavior.
6	1-5	Teacher provides a reminder or negative attention to pupil for all pupil behaviors.
7	1-3	Teacher warns subject engaged in either high task, task, or neutral activity.
8	1-5	Teacher admonishes, or punishes the group in which subject is a member for any pupil activities 1-5.
9	1-5	Teacher admonishes or punishes subject for any of the pupil behaviors 1-5.

Teacher Behavior Index: The formula for arriving at index is

$$\sum^{X}\text{ideal} - \sum^{X}\text{non-ideal} + 10 = {}^{X}\text{Index}.$$

TABLE 12

POSTTEST OBSERVATIONS OF TEACHER BEHAVIOR IN CATEGORIES OF IDEAL, NON-IDEAL, AND TEACHER INDEX

Experimental Group, Identified Ss				Experimental Group, Non-Identified Ss			
Pupil No.	Teacher Behavior Ideal	Non-Ideal	Index	Pupil No.	Teacher Behavior Ideal	Non-Ideal	Index
3	29	3	36	4	11	0	21
8	4	2	12	7	2	2	10
10	5	0	15	9	2	1	11
15	28	2	36	16	8	3	15
18	29	0	39	17	21	0	31
22	22	5	27	21	5	3	12
25	91	14	87	26	46	11	45
Mean	29.7	3.7	36.0	Mean	13.6	2.9	20.7
S.D.	27.0	4.5	23.0	S.D.	14.6	3.5	12.0

Control Group, Identified Ss				Control Group, Non-Identified Ss			
Pupil No.	Teacher Behavior Ideal	Non-Ideal	Index	Pupil No.	Teacher Behavior Ideal	Non-Ideal	Index
2	6	0	16	1	30	0	40
5	15	1	24	6	2	2	10
12	13	11	12	11	6	4	12
13	35	0	45	14	4	3	11
19	10	0	20	20	7	7	10
23	23	28	5	24	33	2	41
27	37	33	14	28	5	8	7
Mean	19.9	10.4	19.4	Mean	12.4	3.7	18.7
S.D.	11.1	13.3	11.8	S.D.	12.2	2.6	13.8

Comparison of Groups

The first hypothesis stated, "Teachers receiving training in the application of the reinforcement model will show greater conformity to that model than will teachers in the control groups." The difference between ratings of experimental and control group teachers for identified subjects was calculated. Table 13 presents the results of a t test performed between experimental and control group teachers for identified subjects.

TABLE 13

COMPARISON OF MEAN TEACHER BEHAVIOR (POSTTEST TEACHER INDEX) FOR EXPERIMENTAL AND CONTROL GROUPS WITH IDENTIFIED SUBJECTS

Groups	N	M	S. D.	t
Experimental	7	36.0	23.0	1.56
Control	7	19.4	11.8	

$p_{.05} = 1.89$.

The first hypothesis was not supported by the data. The training provided teachers in the experimental group was not sufficient to result in differences at the .05 level between experimental and control group teachers in using the reinforcement methods. It should be noted, however, that the means were found to lie in the predicted direction. Furthermore, Fisher's exact method (Walker and Lev, 1953, p. 435) performed on the two groups resulted in a difference significant at $p < .05$. The large within-group variances and small N clearly reduced the probability of establishing significance on the t test.

The second hypothesis stated, "Teachers in the experimental group will demonstrate greater conformity to the reinforcement model in relation to pupils identified to them as subjects than with the non-identified subjects." Table 14 presents the results of a t test performed on the difference between ratings of experimental group teachers for identified and non-identified subjects.

TABLE 14

COMPARISON OF MEAN TEACHER RATINGS (POSTTEST TEACHER INDEX) FOR EXPERIMENTAL GROUPS WITH IDENTIFIED AND NON-IDENTIFIED SUBJECTS

Groups Compared	N	M	S. D.	t*
Identified Ss	7	36.0	23.0	1.21
Non-identified Ss	7	20.7	12.0	

$P_{.05} = 1.89$

*t test for matched subjects.

The difference between ratings of experimental group teachers for identified and non-identified subjects was not sufficient to be significant at the .05 level. Although the difference between the means was in the predicted direction, the null hypothesis could not be rejected.

Trends during the Experiment

Before experimental procedures were begun, baserate measures were taken of both pupil and teacher behavior. Additional observations were made midway through the study and at the end of the six-week period. It should be noted that teacher behavior was rated on a five-point scale during the baserate observations and extended to nine categories during the mid- and posttest observations. This change permitted the detection of differences between teacher behavior toward individual subjects and groups which included the subject. The four added categories on the mid- and posttest observations made the possible range greater than that of the baserate observations. Therefore any comparison of scores for baserate and other observation periods would need to take this difference into account.

Table 15 presents the means of teacher index ratings for baserate, mid-study, and posttest observations.

TABLE 15

COMPARISON OF MEANS FOR TEACHER INDEX SCORES FOR BASERATE, MID-STUDY, AND POSTTEST OBSERVATIONS

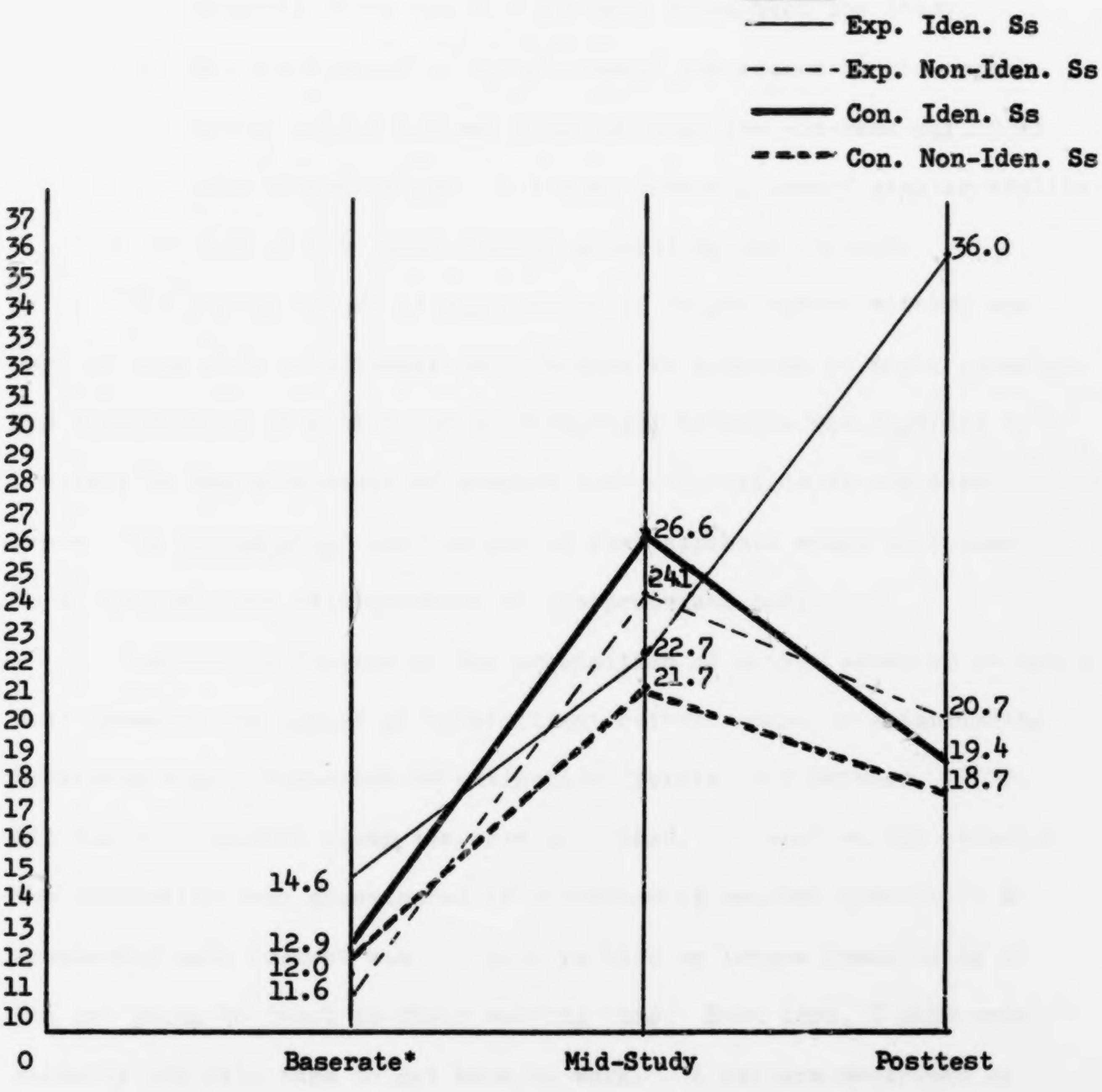
Groups Compared	N	Baserate		Mid-Study		Posttest	
		M	S. D.	M	S. D.	M	S. D.
Exp. Iden. Ss	7	14.6	6.9	22.7	9.0	36.0	23.0
Con. Iden. Ss	7	12.9	2.0	26.6	10.1	19.4	11.8
Exp. Non-Iden. Ss	7	11.6	2.5	24.1	23.1	20.7	12.0
Con. Non-Iden. Ss	7	12.0	1.7	21.7	8.3	18.7	13.8

Several generalizations of a necessarily tentative nature can be drawn from a review of Diagram 2:

1. The initial means differed only slightly from each other, hence the randomization process achieved comparable groups.

DIAGRAM 2

COMPARISON OF MEANS FOR INDEX OF TEACHER BEHAVIOR
OVER TIME (TOOS)



*Baserate scale differs from that for the later measures (see text).

2. Control group teachers treated identified and non-identified subjects similarly, and did not alter this treatment in the course of the study. These teachers had been urged simply to maintain their tried techniques throughout the study.
3. The application of reinforcement procedures by the experimental groups was not constant over the six-week period of this investigation. A trend, however, toward greater application of the reinforcement procedures was evident.

The uneven nature of application of reinforcement methods was seen to have some unfortunate implications in relation to pupil behavior. The disregarding of neutral or inappropriate behavior was regarded as a keystone to the attainment of greater task orientation in the experimental group. An inconsistent application of that approach would be tantamount to an intermittent reinforcement of inappropriate behaviors.

Laboratory studies of the acquisition of social behavior patterns have revealed the impact of intermittent reinforcement in establishing behaviors highly resistant to extinction (Ferster and Skinner, 1957). All the experimental group teachers mentioned, at least on one occasion, the difficulty they experienced in disregarding neutral behavior. A frequently made comment was, "I have to bite my tongue continually if I'm not going to react to their wasting time. Even then, I slip occasionally and tell them to get back to work." A pattern described by Bandura and Walters (1963, p. 7) of the parent who disregards or ignores mild forms of attention seeking but responds only when the child's behavior is frequent or intense is analogous to the pattern of teacher responses.

4. An increasing conformity to the reinforcement model by experimental group teachers suggested that, over time, the behavior

of these teachers changed from that existing before the study began.

The line representing the experimental non-identified group fell consistently below that of the experimental identified group. Earlier discussion pointed to the likely effects of periodic reminders resulting in greater resistance to extinction of the inappropriate behaviors than the use of continuous reminders. If so, little improvement in task-oriented behaviors could be expected in the experimental non-identified group.

A comparison of means in Diagram 2 suggests that the behavior of experimental group teachers shifted in the direction of conforming to the reinforcement model. However, any effect to which subjects were exposed appears to have been the changing pattern of contingencies from week to week.

Two implications follow from these observations. One, any changes in the behavior of identified subjects in the experimental group would be associated with changing, not constant, exposure to the reinforcement procedures. Two, future investigations should provide teachers a sufficiently long period of time for new responses to be learned and practiced before an attempt is made to measure their effect on pupils' behavior.

The question for future research might be phrased, "Do teachers decrease the frequency of responding to pupils when experimental procedures call for them to react in unfamiliar or otherwise prohibited ways?"

Although these questions are not within the scope of the present study to answer, the application of experimental procedures to naturalistic settings must reckon with these variables.

Hypotheses Suggested by Trends in the Data

In-service training programs for a school staff seeks to achieve desired changes in teachers' behavior. What are the effects of introducing changes in teachers' behavior? Instructing teachers to use an unfamiliar method may have had effects not anticipated in the design of the study. An examination of the teacher-pupil matrices suggests several hypotheses which future research might be designed to test.

Changes in the pupil-management behavior of teachers may have disturbed the equilibrium of the teacher-pupil relationship. Experimental group teachers' use of category 7 "teacher warns subject behaving disruptively" was curtailed in spite of a relatively large number of disruptive behaviors. In many schools the practice of sending misbehaving pupils to the office has been regarded as a failure of the teacher to deal with her own pupils. Reversing common practice and asking teachers to remove misbehaving pupils may have resulted in an avoidance of those pupils. Indeed, experimental group teachers for both identified and non-identified subjects may have done just that. A chi square comparison found experimental group teachers disregarding subjects more than instructing them whereas the reverse pattern was true of control group teachers ($.1 > p > .05$). The comparison for experimental versus control group teachers was similar for non-identified subjects ($.2 > p > .1$). This result was not expected in the design of the study and raises questions regarding the tendency of teachers to avoid/disregard subjects when instructed to behave in ways incompatible with previous practices.

Pupil Behavior

In spite of the absence of clear evidence that the teachers were consistent in applying the reinforcement model, the possible effects of slight changes on pupil behavior were examined. Three criterion measures were used in assessing changes in pupil behavior. Direct observation of pupils using the TOOS provided measures of the time subjects spent in task-oriented behaviors (1) at all times over all conditions, and (2) when the teacher was not working directly with the subjects (independent task-oriented behavior). The PBC provided a measure of the teacher's judgment of the pupil's behavior.

The first three hypotheses in the second phase of the study were stated as follows:

1. Children having low rates of task-oriented behaviors will devote more time to task activities after working with teachers trained in reinforcement methods than children whose teachers have not been so trained.
2. Children having low rates of task-oriented behaviors will devote more time to task activities when they have been identified to their teachers as subjects rather than when they have not been identified as subjects.
3. There will be no interaction effect between treatment and identification status on time devoted to task activities.

Table 16 presents pretest, posttest, and adjusted posttest means for treatment and identification status for experimental and control groups.

TABLE 16

PRETEST, POSTTEST, AND ADJUSTED POSTTEST MEANS FOR PUPIL SCORES ON TOOS

Treatment Groups	Pretest Means			Posttest Means			Adjusted Means		
	Iden.	N-Iden.	Total	Iden.	N.Iden.	Total	Iden.	N-Iden.	Total
Experimental	1.89	2.06	1.97	1.73	1.77	1.75	1.76	1.76	1.76
Control	2.04	2.06	2.05	1.68	1.63	1.66	1.67	1.62	1.65
Total	1.96	2.06	2.01	1.70	1.70	1.70	1.71	1.69	1.70

Inspection of the trends in the means suggests the following relationships:

1. Both identified and non-identified Ss in the control groups showed greater increases in task-oriented behaviors (reflected by lower means) than pupils in the experimental groups. This effect is in a direction opposite to that predicted by the hypothesis and suggested that reinforcement procedures attempted by the experimental teachers had less effect than the techniques ordinarily used by the control teachers.
2. Identification effects might be present in the control group where identified Ss were rated as showing fewer task-oriented behaviors than non-identified Ss.

Table 17 presents the analysis of covariance of pupil scores on the TOOS. This analysis permitted comparisons between experimental and control groups, between pupils identified and not identified as subjects, and the related interaction effect. Posttest means were regarded as variates and baserate means as the covariates. This analysis was performed by the Stanford Computation Center facilities using the BMD 03V program entitled, Analysis of Covariance - Version of February 19, 1964 - Health Sciences Computing Facility, U.C.L.A.

TABLE 17

ANALYSIS OF COVARIANCE OF THE TASK-ORIENTED BEHAVIORS OF PUPILS (TOOS)

Source of Variation	Degrees of Freedom	Sums of Squares	Mean Squares	F.
A. Treatment	1	.352	.352	3.18
B. Identification	1	.017	.017	.15
A X B	1	.100	.100	.91
Within	23	2.56	.111	

The F ratios associated with treatment, identification, and interaction effects failed to attain the .05 level necessary for rejection of the null hypothesis. Consequently, none of the first three hypotheses was established as true.

The implication drawn from the foregoing analysis was the procedures used by the experimental group were no more effective than those used by the control group in increasing the time pupils spent in task-oriented behaviors and possibly less so. Since the experimental teachers apparently did not apply the reinforcement techniques consistently, it is not surprising that pupils' behaviors remained unaffected.

Hypotheses four, five, and six in phase two of the study were stated as follows:

4. Children having low rates of task-oriented behaviors will show greater independence in task completion after working with teachers trained in reinforcement methods than children whose teachers have not been so trained.
5. Children having low rates of task-oriented behaviors will show greater independence in task completion when they have been identified to their teachers as subjects than when they have not been identified as subjects.
6. There will be no interaction effect between treatment and identification status on independence in task completion.

These hypotheses differed from the first three in that the variable of concern was that of independent task behaviors. Independent task-oriented behaviors referred to the task behavior of pupils when the teacher was engaged elsewhere in the room. A criterion measure of independent behavior was required. As described earlier under Procedures, the measure was obtained from the teacher-pupil matrix, in which the frequency of Pupil Behaviors "1" and "2" (high-task orientation) were tabulated during the time teachers were rated in cell 5 ("disregarding the subject"). A charting of these scores was arranged in Table 18. Task-oriented behavior in this sense was regarded as the proportion of pupils' responses falling in the first two categories. These behaviors have been designated as TOB 5-12; that is, Teacher Behavior "5", and Pupil Behaviors "1" and "2". For example, in Table 18 Pupil 3 attained 60 per cent independent task behaviors. This pupil, out of a total of 424 five-second intervals, spent 254 (60 per cent) engaged in appropriate task-oriented behaviors.

TABLE 18

POSTTEST RATINGS OF PUPIL BEHAVIOR WITHOUT DIRECT SUPERVISION OF THE TEACHER (INDEPENDENT TASK-ORIENTED BEHAVIOR, TOB 5-12)

Groups Compared	Pupil No.	Pupil Behaviors					Sum 1-2	Sum 1-5	Per cent of Desirable Behavior 1-2/1-5
		Desirable 1	2	3	Undesirable 4	5			
Experimental Group (Subjects Identified)	3	224	30	142	16	12	254	424	60
	8	91	60	68	10	0	151	229	66
	10	303	34	36	0	0	337	373	91
	15	92	9	33	35	0	101	169	60
	18	238	3	45	16	0	241	302	80
	22	161	30	96	52	11	191	350	55
	25	149	19	152	27	0	168	347	49
	Mean	180	26	82	22	3	206	313	65.9
Control Group (Subjects Identified	2	427	10	64	10	0	437	511	85
	5	39	23	54	4	0	62	120	50
	12	91	24	77	15	0	115	207	56
	13	83	4	82	23	0	87	192	45
	19	23	19	66	9	0	42	117	36
	23	221	30	80	19	0	251	350	72
	27	106	6	73	17	0	112	202	56
	Mean	141	17	71	14	0	158	242	57.4
Experimental Group (Subjects Not Identified)	4	262	39	108	26	0	301	435	69
	7	148	38	51	3	0	186	240	77
	9	288	10	41	0	0	298	339	88
	16	70	5	84	32	0	75	191	39
	17	223	16	50	7	0	239	296	81
	21	85	15	191	92	0	100	383	26
	26	202	7	87	55	0	209	351	60
	Mean	185	19	88	32	0	201	324	62.8
Control Group (Subjects Not Identified)	1	263	14	144	19	0	277	440	63
	6	146	33	22	2	0	179	203	88
	11	145	5	55	7	0	150	212	71
	14	33	2	107	24	0	35	166	21
	20	150	9	47	7	0	159	213	75
	24	330	36	46	15	0	366	427	86
	28	210	21	36	2	0	231	269	86
	Mean	182	17	65	11	0	199	276	70.1

Table 18 presented the posttest scores only and illustrated the manner in which independent task-oriented behaviors were calculated. Table 19 presents pretest, posttest, and adjusted posttest means for treatment and identification status for experimental and control groups.

TABLE 19

PRETEST, POSTTEST, AND ADJUSTED POSTTEST MEANS FOR TREATMENT AND IDENTIFICATION STATUS FOR INDEPENDENT TASK-ORIENTED BEHAVIOR (TOB 5-12)

Treatment Groups	Prestest Means			Posttest Means			Adjusted Means		
	Iden.	N-Iden.	Total	Iden.	N-Iden.	Total	Iden.	N.-Iden.	Total
Experimental	50.7	43.3	47.0	65.9	62.8	64.3	64.8	63.6	64.2
Control	49.0	44.1	46.0	57.4	70.1	63.7	56.8	70.7	63.8
Total	49.8	43.7	46.5	61.6	66.4	64.0	60.8	67.2	64.0

Inspection of the trends in the means suggested the following relationships:

1. An increase in independent task-oriented behaviors of all pupils occurred over the six-week period of the experiment.
2. When pooled over identification status, the difference between the means of the experimental and control groups was negligible. When compared separately, identified Ss in the experimental group showed a larger mean for independent task behaviors than identified Ss in the control group. The reverse relationship was true in the comparison of pupils not identified as Ss with the control group mean

exceeding the experimental group mean. The means for identified Ss did favor the experimental group as predicted.

3. When pooled over treatment status, the means for identified Ss were lower than non-identified Ss. This result again, as part of the interaction, is in a direction opposite to that predicted by hypothesis five.

Table 20 presents the analysis of covariance with posttest per cents as variates and baserate per cents as covariates.

TABLE 20

ANALYSIS OF COVARIANCE OF INDEPENDENT, TASK-ORIENTED BEHAVIORS FOR IDENTIFIED AND NON-IDENTIFIED Ss IN THE EXPERIMENTAL AND CONTROL GROUPS (TOB 5-12)

Source of Variation	Degrees of Freedom	Sums of Squares	Mean Square	F
A. Treatment	1	.06	.06	.00
B. Identification	1	307.12	307.12	.79
C. Interaction	1	356.67	356.67	.91
D. Within	23	8975.25	390.22	---

The information presented in Table 20 was relevant to a test of hypotheses four, five, and six. The F ratios associated with treatment, identification, and interaction effects failed to attain the .05 level necessary for the rejection of the null hypotheses. While the trend was far from statistically significant, the mean of identified Ss in the experimental group did exceed that of control group Ss. This was in contrast to the findings from the first hypothesis that control group Ss had a greater total of task-oriented behaviors. A hypothesis for future testing would maintain that reinforcement procedures would result in an increase in independent task behaviors although immediate effects might not reveal a similar increase in overall task-oriented behavior.

Hypotheses seven, eight, and nine were stated as follows:

7. Children having low rates of task-oriented behaviors will be rated as having fewer problem behaviors after working with teachers trained in reinforcement methods than children whose teachers have not been so trained.
8. Children having low rates of task-oriented behaviors will be rated as having fewer problem behaviors when they have been identified to their teachers as subjects than when they have not been identified as subjects.
9. There will be no interaction effect between treatment and identification status on number of rated problem behaviors.

The Problem Behavior Checklist consisted of 39 items describing pupil behaviors incompatible with task orientation. High scores indicated a larger number of low or non-task behaviors while low scores indicated more task-oriented behaviors.

Table 21 presents the pretest, posttest, and adjusted means for treatment and identification status for the experimental and control groups.

TABLE 21

PRETEST, POSTTEST, AND ADJUSTED POSTTEST MEANS FOR TREATMENT AND IDENTIFICATION STATUS ON THE PROBLEM BEHAVIOR CHECKLIST (PBC)

Treatment Groups	Pretest Means			Posttest Means			Adjusted Means		
	Iden.	N-Iden.	Total	Iden.	N-Iden.	Total	Iden.	N-Iden.	Total
Experimental	2.26	2.07	2.17	2.27	2.22	2.25	2.34	2.40	2.37
Control	2.74	2.45	2.60	2.55	2.06	2.30	2.34	2.02	2.18
Total	2.50	2.26	2.38	2.41	2.14	2.27	2.34	2.21	2.28

Inspection of the trends in the means suggested the following relationships:

1. Unidentified pupils in the experimental groups were rated by their teachers as having increased slightly in the number of problem behaviors while Ss in the control groups were rated as having decreased in the number of problem behaviors. When pooled over identification status, control groups were rated as having shown greater improvement (larger decreases in problem behaviors) than were Ss in the experimental groups. Means comparing ratings of control and experimental groups were found to lie in a direction opposite to that predicted by hypothesis seven. However, the corresponding F ratios were not significant.
2. Identified Ss in the experimental group revealed little or no change in their status over the six-week period but identified Ss in the control group were rated as having

improved. The identical adjusted means failed to reveal the changes that had occurred in the ratings of teachers. Over the six-week period, non-identified Ss in the control group were rated as having shown fewer problem behaviors while experimental group Ss were rated as having shown more problem behaviors. Non-identified Ss in the experimental group increased their problem behavior more than any of the other three groups who either remained the same or decreased in the number of problem behaviors. Such a result might have been predicted if inappropriate or neutral responses had been intermittently reinforced by teacher attention. The application of reinforcement methods by teachers of non-identified Ss in the experimental group did fall below that of identified Ss but above the two control groups (whose performance was relatively similar throughout the six-week period). On the basis of this analysis, a hypothesis for future research would assert that if teachers reprimand or admonish pupils intermittently at those times when their behavior became disruptive, the frequency of disruptive behaviors would increase.

3. When pooled over treatment status, both identified and non-identified Ss revealed decreases in the number of problem behaviors. Because differences between ratings of identified and non-identified Ss were slight, no direction was inferred from an examination of the means.

Table 22 presents the analysis of covariance of mean scores of pupils on the PBC in all four groups.

TABLE 22

ANALYSIS OF COVARIANCE OF MEANS OF TEACHER RATINGS OF PUPIL BEHAVIOR ON THE PROBLEM BEHAVIOR CHECKLIST FOR EXPERIMENTAL AND CONTROL GROUPS

Source of Variation	Degrees of Freedom	Sums of Squares	Mean Squares	F
Treatment	1	.122	.122	.53
Identification	1	.116	.116	.56
Interaction	1	.033	.033	.15
Within	23	5.008	.217	

The F ratios associated with treatment, identification, and interaction effects failed to attain the .05 level necessary for rejection of the null hypothesis.

In order to determine which of the 39 behavioral descriptions discriminated between Ss in the experimental and control groups, analyses of covariance were computed for each item. This was done first for pupils identified as Ss and then for pupils not identified as Ss.

Table 23 presents a comparison of pretest, posttest, and adjusted means for those items which resulted in probability values for F greater than .1 in the comparison of identified Ss in the experimental and control groups.

TABLE 23

COMPARISON OF MEANS OF TEACHER RATINGS ON SPECIFIC ITEMS RESULTING IN Fs IN EXCESS OF .10 FOR IDENTIFIED Ss IN THE EXPERIMENTAL AND CONTROL GROUPS

Item No.	Pretest Means		Posttest Means		Adjusted Means		Probability Values for F Level
	Exp.	Control	Exp.	Control	Exp.	Control	
16	1.86	2.57	1.71	3.28	1.87	3.12	.05
22	1.00	1.00	1.00	1.43	1.00	1.43	.10
33	1.29	2.28	1.71	1.71	2.08	1.33	.10

Items 16, 22, and 33 were stated as follows:

16. Cannot make or keep friends.

22. Objects or refuses to go to school

33. Has violent outbursts of temper.

On items 16 and 22, the means were found to lie in the direction predicted by hypothesis five. That is, Ss in the experimental group were rated as showing larger decreases in the number of problem behaviors than pupils in the control group. Item 33 indicated that experimental group teachers rated Ss as having increased the number of temper outbursts while Ss in the control groups were rated as showing fewer tantrums.

Table 24 presents a comparison of pretest, posttest, and adjusted means of those items which resulted in Fs greater than .10 in the comparison of non-identified Ss in the experimental and control groups.

TABLE 24

COMPARISON OF MEANS OF TEACHER RATINGS ON SPECIFIC ITEMS RESULTING IN Fs IN EXCESS OF .10 FOR NON-IDENTIFIED Ss IN THE EXPERIMENTAL AND CONTROL GROUPS

Item No.	Pretest Means		Posttest Means		Adjusted Means		F Level Obtained
	Exp.	Control	Exp.	Control	Exp.	Control	
1	2.71	2.86	3.28	2.14	3.34	2.09	.10
16	1.14	2.86	1.29	2.14	2.15	1.27	.10
20	1.86	2.29	2.86	1.86	2.96	1.75	.01
21	3.43	3.00	3.43	2.00	3.27	2.16	.05

Items 1, 16, 20, and 21 were stated as follows:

1. Talks out or shouts without permission.
16. Cannot make or keep friends.
20. Quickly insists he cannot do a thing.
21. Seldom completes work.

Items 20 and 21 did achieve significance at the designated .05 level. However, since both analyses favored the control group, research hypothesis six was rejected. Item 16 found control group teachers rating Ss as showing improvement in making and keeping friends. This finding was in direct contrast to comparisons of experimental and control group teachers with identified Ss. These few significant findings from a large number of analyses can only be suggestive of future hypotheses and cannot be considered conclusions from this study.

Teacher Judgment and Observed Pupil Behavior

Teacher judgment of pupil behavior was recorded on the Problem Behavior Checklist, a 39-item descriptive rating scale. All behaviors described were designated as incompatible with task-oriented behavior. High scores on the PBC therefore would be consistent with high ratings on the TOOS and with low scores on independent task orientation.

Were teacher ratings of pupil behavior consistent with the results of direct observation of pupils? A Pearson product-moment correlation was calculated between posttest PBC and TOOS mean scores for all 28 pupils (Table 25). It should be borne in mind that high scores on the PBC and TOOS instruments reflected behaviors incompatible with task orientation. Conversely low scores on both measures indicated high task orientation.

TABLE 25

CORRELATION OF POSTTEST PBC AND TOOS SCORES FOR ALL PUPILS IN THE EXPERIMENTAL AND CONTROL GROUPS

Variables	N	Mean	S. D.	r.
Posttest Means PBC	28	2.27	.55	.293
Posttest Means TOOS	28	1.71	.33	

An r of .307 would have been required to reject the null hypothesis at the .05 level. Observations and ratings were confined to disruptive pupils which reduced the range of scores. However, it could not be concluded that the PBC ratings were significantly related to the observations of task-oriented behavior.

Table 26 presents the correlation between posttest PBC means and the percentage of independent task-oriented behaviors (TOOS; TOB 5-12).

TABLE 26

CORRELATION OF POSTTEST MEANS ON THE PBC AND PERCENTAGE OF TIME ENGAGED IN TASK-ORIENTED BEHAVIORS (TOOS; TOB 5-12)

Variables	N	Mean	S. D.	r
Posttest Means PBC	28	2.27	.55	.013
Percentage Task Behav. TOOS	29	63.8	19.0	

For an N of 28, a coefficient of .307 or greater could occur by chance less than five per cent of the time if the true r were zero. Since the obtained r falls below that level, the hypothesis that the true r is zero cannot be rejected. It was concluded that teacher judgment of pupil behavior and the ratings of independent task-oriented behavior by observers failed to show a greater than chance association.

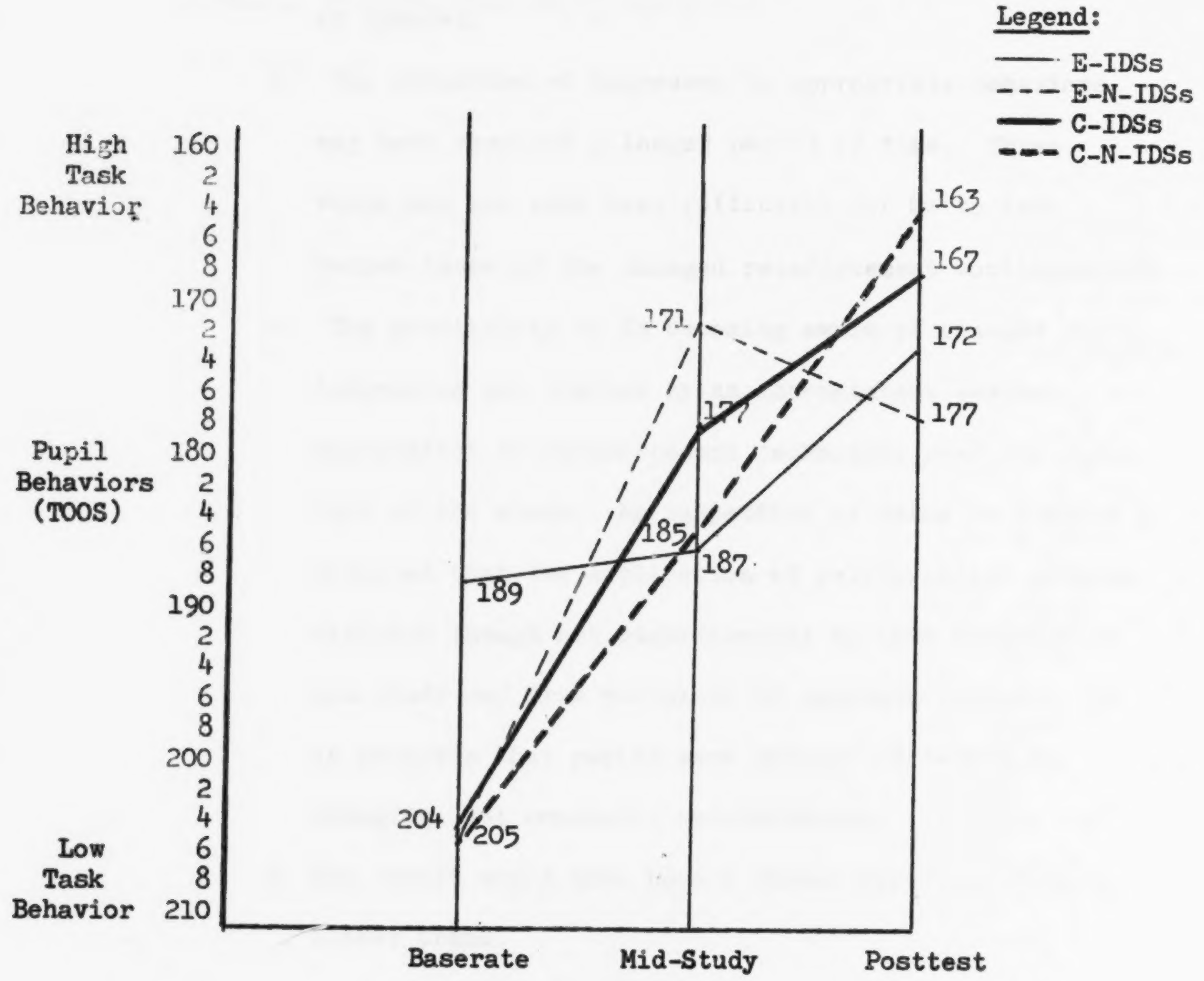
Trends during the Experiment

A review of pupil behavior in the four groups was arranged in Diagram 3 for a closer inspection of trends. The mean pupil behavior for each group is presented for the three observational periods. Tentative generalizations have been summarized as follows:

1. Initial group means were similar with the exception of experimental subjects identified to the teacher. The baserate elevation of the mean of the identified Ss in the experimental group presumably was the result of sampling error; it is not significantly different from other means.
2. In the course of the six-week period, all group means increased.
3. The failure of the mean for identified experimental Ss to change over the first three-week period may have been the result of some or all of the following variables:

DIAGRAM 3

COMPARISON OF MEANS FOR TASK-ORIENTED BEHAVIOR OVER TIME



N = 28. Based on scores of TOOS.

  a. Previously intermittently rewarded non-task behaviors may have undergone a temporary increase when disregarded or ignored.
  b. The detection of increases in appropriate behaviors may have required a longer period of time. Three weeks may not have been sufficient for Ss to have become aware of the changed reinforcement contingencies.
  c. The possibility of Ss becoming aware of changed contingencies was limited by an inconsistent teacher application of reinforcement techniques over the duration of the study. An inspection of means in Diagram 2 revealed that the application of reinforcement methods differed though not significantly so from baserate to mid-study and from mid-study to posttest periods. It is possible that pupils were exposed therefore to changing, not constant, reinforcement.
  d. The result could have been a chance departure from a linear trend.

4. The period from mid-study observation with final ratings indicated an increase in task behaviors for identified Ss in the experimental group not discriminable from other groups. Since teachers appeared to have made a somewhat increased use of recommended reinforcement techniques during this period, a longer study period might have provided a better measure of their effectiveness.
5. The means for the non-identified subjects in the experimental groups decreased over the second three-week period. This

decrease was in marked contrast to the pattern of increases in task behaviors demonstrated by other groups. The trends revealed by these data will require verification by further experimentation.

CHAPTER IV

SUMMARY AND CONCLUSIONS

Summary

Design

The purpose of the study was to evaluate experimentally reinforcement procedures designed to increase the task-oriented behavior of elementary school pupils. Inattentive pupils present problems to themselves, teachers, and other pupils. Such problems tend to be self-perpetuating, often leading to a deterioration of learning. The purpose of the study was to design and test a method which could be applied by teachers. It was hypothesized that application of this method would increase the number of task-oriented behaviors.

The procedures were derived from two main sources: (1) The literature in the area of attention pointed to the significance of the processes through which responses to stimuli can either be increased in intensity or can be diminished through habituation (Berlyne, 1960; Solly, 1957). (2) Social learning theory, with particular emphasis upon positive reinforcement and non-reward, formed the basis for the treatment strategy (Bandura and Walters, 1963; Ferster and Skinner, 1957; Bijou, 1964). Recent clinical investigations of the application of reinforcement procedures to cases of deviant behavior seemed to fit naturally into the setting of the school in the remediation of common learning problems (Patterson, 1964; Mech, 1957; Russo, 1964).

The criterion measures were the number of task-oriented behaviors, the proportion of independent task-oriented behaviors and teacher ratings of the number of problem behaviors.

In order to eliminate or reduce bias in results, the following elements were employed in the design: (1) Control group teachers were led to believe that their methods were of special interest to the study. (2) Some pupils were not identified to teachers as Ss and were observed without the teacher's knowledge. (3) Observers who collected criterion data were not informed about the experimental treatments or the membership of Ss in the various treatment groups.

An observational instrument was developed to record in a reliable fashion the relevant behavior of pupils and their teacher simultaneously. A pilot study was completed in another school district in order to make necessary improvements in the observational schedule.

Pupils and teachers were drawn from second grade classes in an elementary school district. Fourteen teachers nominated pupils they believed to be inattentive. From each class, two children were selected from those nominated and randomly assigned as an identified or non-identified subject. Although both children were observed throughout the study, the pupil identified to the teacher as the subject was intended to be the main recipient of the treatment methods outlined to the teachers.

The teachers were randomly assigned to the experimental and control groups. Those assigned to the experimental group received a short training program in the use of specific reinforcement methods. Control group teachers were asked to use whatever techniques they had previously found to be effective in increasing pupil attention. Both experimental and control group teachers were cautioned to confine their efforts as much as possible to the pupil identified as the subject.

The study was continued for a six-week period. Teacher and pupil behaviors were observed at three-week intervals. Observers were selected from women in the community.

Results

The results were analyzed first for differences in the extent to which reinforcement methods were actually applied by control and experimental teachers. The t test comparisons between experimental and control groups for both identified and non-identified Ss failed to reveal a significant difference at the .05 level. However, Fisher's exact method resulted in differences at the .05 level for comparisons between experimental and control group teachers with identified subjects.

The recommended techniques were not uniformly applied by the experimental teachers throughout the study. In order for pupils to respond to the experimental method, its constant application was believed to be essential. The detection of differences between teacher methods was further limited by the narrow range of teacher behavior in all groups plus the inclination for some teachers in the control group to prefer reinforcement techniques similar to those of the experimental group.

Hypothesis one asserted that after six weeks of treatment pupils in the experimental groups would exhibit more task-oriented behavior than pupils in the control groups. The means differed but not significantly, in a direction opposite to that predicted.

Hypothesis two asserted that pupils identified as Ss would show a larger number of task-oriented behaviors than pupils not identified as Ss. Differences between identified and non-identified Ss were negligible, however.

Hypotheses four and five were concerned with independent task behaviors. Hypothesis four asserted that Ss in the experimental groups would show a larger number of independent task behaviors than Ss in the control groups. The difference was not significant though it was in the predicted direction. This difference was in contrast to the findings of the analyses of task behaviors generally. While not statistically significant, this contrast suggested the hypothesis that whereas the conventional approach of reminding, coercing, and prodding might result in a larger number of immediate task-oriented behaviors, it was not as likely to produce independent task behaviors as the recommended reinforcement procedures.

Differences between identified and non-identified subjects in independent task behaviors specified by hypothesis five were not significant. The interaction effects predicted by hypothesis three and six were also not observed.

Hypothesis seven maintained that Ss in the experimental groups would be rated by their teachers as having fewer problem behaviors. Differences between experimental and control Ss, between identified and non-identified Ss, and related interaction effects were all negligible. A few specific behaviors rated by teachers were found to discriminate between experimental and control group Ss but only some of these in the direction predicted by the hypotheses.

A correlation was calculated to determine the relationship between teacher judgment of pupil behavior and scores from direct observations of pupil behavior. It was concluded that teacher ratings of pupil behavior and observed pupil behavior were not significantly related ($r = .29$).

Perhaps the most significant finding from this investigation concerned the manner in which the behavior of teachers was affected during the process of learning an unfamiliar technique. In spite of the training provided and instructions to use the recommended reinforcement procedures, teachers found that a consistent application was virtually impossible. Disregarding the idle, inattentive behavior of pupils was seen as important but contrary to past experience and habits. Teachers' frustration in being unable to apply consistently the experimental procedure was seen as evidence that considerably more than the usual in-service training program would be required if the reinforcement model were to be consistently applied and tested.

Suggestions for future research

The findings suggest that future research along lines similar to the present study should include the following provisions:

1. A more intensive training program. Bijou (1964) has pointed out the difficulty experienced by parents of socially deviant children to profit from suggestions for changed behavior without a specific training program. Approaches to this difficulty have been met variously by using an electronic signalling device to indicate when the parent is using the proper techniques (Bijou, 1964) and by modeling the desired parent responses for the parent with his child (Russo, 1964). In order for teachers to learn to apply given techniques, training devices such as modeling and immediate reinforcement should be tried.

2. A minimum standard of competence in using reinforcement methods. Variability in the behavior of teachers over time was believed to have been a major hurdle in preventing a complete test of the efficacy of the reinforcement model. In view of the problems resulting from teacher variability, a criterion level of consistent performance might have been imposed. That is, following the training program, teachers would be permitted to start application of techniques only as they attained a specified level of proficiency in that technique.
3. A larger sample. Whereas teacher variability in performance may always be present, a larger sample of teachers would have the effect of reducing the amount of variance due to sampling errors.
4. A uniform application of reinforcement methods. The experimental teachers tended to use the recommended reinforcement procedures more toward the end of the six-week period than they did earlier. In order to test the efficacy of the reinforcement model, a relatively constant level of performance would have been important. Although a strong application of reinforcement methods might be assured by imposing a criterion level of performance, an additional criterion for consistency of performance over time would be valuable.
5. A more heterogeneous sample. Purposes of generalizability would be served by extending the research to include female subjects as well as males, pupils in higher and lower grades, and pupils representing broader socio-economic levels.

6. A longer experimental period. Although a better test of the reinforcement model would have been facilitated by more extensive teacher training, the time itself may have represented an important factor in preventing the detection of important changes in pupil behavior. The opportunity for pupils to adapt to changed reinforcement contingencies would have to be provided if the application of reinforcement methods in a naturalistic setting is to be accurately measured.
7. Additional criteria. Further research could profitably include criteria measuring changes in achievement as well as attention-related behaviors, e.g., length of time a pupil attends to a task without interruption, and resistance to distractions. The possibility of developing other measures of independent task behaviors in the absence of teacher supervision might help to confirm some promising trends revealed by this study.

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Appendix A

SAN CARLOS ELEMENTARY SCHOOL DISTRICT

INCREASING TASK BEHAVIOR
(An Experimental Study)

Background:

Approval has been granted by the District to conduct a study of teaching methods which affect the way pupils attend to their classwork. Because of the importance of developing effective learning patterns as early as possible, the study will be confined to the second grade and will focus on boys who have difficulty sustaining attention on their work.

Most important, your cooperation is solicited to participate in this study. Requirements of time, measurement, etc. are explained below.

What are the time demands?

A participating teacher will need to spend a few hours at first in order to

1. identify children in her room who have difficulty with attention
2. to become familiar with the experimental design.

After the initial orientation, no further time will be required of the teacher other than filling out a checklist at the end of the time telling how well the youngster is able to work.

While the study is planned to run for six weeks, it has been designed to interfere as little as possible with the usual conduct of the classroom. Pupil behavior will be measured by specially trained observers who will periodically be in to find out how a particular child is getting along.

Some general information:

The study is being directed by Dwight Goodwin, who, as many of you know, has served as psychologist for the San Carlos schools for the past several years. Near the beginning of the study, he will make brief visitations to answer any questions which arise and to offer whatever assistance lies within the scope of the study. Regular referrals will have to wait until next year.

Since the study is designed to find some relationship between teaching methods and pupil behavior, participating teachers will need to meet at the beginning in small groups, the composition of which will be determined within this next week.

In general, the study is planned to begin the second week after the Spring Vacation. Your cooperation is greatly appreciated.

Appendix B

CLASSIFICATION OF PUPIL AND TEACHER BEHAVIOR

PUPIL BEHAVIOR

1. High task orientation. The child reads, writes, figures, and enters into activities determined by the teacher. This includes information seeking, working at the blackboard or at the desk, listening to the teacher, etc. This also includes such activities as raising his hand for assistance, participating in committee activity, reading circle, or other appropriate behaviors.
2. Task orientation. The child is engaged in activites preparatory for work or is carrying out monitor activities such as cleaning the sink, passing papers, collecting work, opening the windows, etc. Assembling materials before work, putting things away would fall into this category.
3. Neutral behavior. This is behavior offering an insufficient number of cues to permit labeling as low or high task orientation. Thus, this category might include sitting quietyly, looking into space, finding objects in the desk to play with, rocking back and forth in his chair, adjusting the materials on his desk, staring at other children, etc.
4. Non-task orientation: This is the behavior which is not only incompatible with the child finishing his work but may be disturbing to other children. Such behavior as socializing with seatmates, mild horseplay, tapping the desk with the pencil, making random noises etc. While mildly disruptive, this behavior is not visible/audible in all parts of the room and may or may not result in the disturbance of other children.
5. Low task orientation: This category is reserved for severe disruptive behaviors which meet the following four criteria: 1) behavior which is not compatible with completing the task, 2) behavior associated with the disruption of the work of others, 3) behavior easily visible and/or audible in all parts of the room and 4) behavior representing a clear deviation from normative behavior in the room. For the individual this might represent banging a door, dropping large objects on the floor, shouting across the room, fighting, etc.

TEACHER BEHAVIOR

1. Positive, rewarding behaviors are teacher responses which include giving compliments to the child, nodding approvingly, patting the child on the shoulder, etc.
2. Instructing-directing behaviors are those activities of the teacher which include explanations, instructions, lecturing, etc., and may be directed either to the whole class, a small group of which the subject is a member, or the child who is being observed.
3. Non-attending or neutral behaviors are those activities in which the teacher is simply occupied elsewhere in the classroom and is not devoting her attention to the child under observation.
4. Warning-explaining behavior are those activities during which an explanation is made privately to the child to the effect that continued disruptive behavior will be followed by removal from the classroom.

Specifically the warning consists of a description of the consequences (in having to leave the room) if particular misbehaviors continue.

5. Aversive behaviors are those falling in the general area of punishment such as expressions of disappointment, anger, warnings expressed aloud to the entire class, etc.

Appendix C

TEACHER MODEL FOR INCREASING ATTENTIVE BEHAVIOR

When the pupil does this, the teacher should do this.

Code:*	PUPIL BEHAVIOR	Code:*	TEACHER BEHAVIOR
1.	High task orientation	1.	provide positive recognition. Positive rewarding behaviors are teacher responses which include giving compliments to the child, nodding approvingly, patting the child on the shoulder, etc.
2.	Task orientation	1. or 2.	alternating approval and explanation of the usefulness of the child's contribution.
3.	Neutral behavior	3.	non-attending response. The child engaged in neutral behavior is not to be reminded to resume work activity. This pupil response is to undergo extinction trials through the withdrawal of all possible teacher reinforcement.
4.	Non-task orientation	3. or 4.	two possibilities. Use a non-attending response as long as the behavior is not resulting in the continued disruption of the work of other children. If the behavior is resulting in the disruption of the work of other children and cannot wisely be ignored, use a warning-explaining response. In this instance, an explanation is made privately to the child to the effect that continued disruptive behavior will be followed by the child's removal from the classroom.
5.	Low task orientation	4.	As the second alternative above. If the behavior does result in the disruption of the work of other children and cannot be wisely ignored, use a warning-explaining response.

*See sheet headed Classification of pupil and teacher behavior.

Appendix D

TASK ORIENTATION STUDY

SURVEY OF TEACHING METHODS

As much as possible answer the following questions on the basis of your own experience. The following descriptions of pupil behavior are believed to be typical of children who have difficulty sustaining attention. Briefly describe what methods you have found effective in helping children who

a. wander about the room, are often out of their seats and seem to have trouble sitting still. ______________________________

____

____

b. spend a considerable amount of time daydreaming, looking out the windows, and are apparently lost in their own thoughts. ______________________________

____

____

c. are excessively verbal, either talking to other children or themselves and seem unable to sit quietly and work. ______________________________

____

____

d. are highly eager to do whatever is asked but after a few moments, lose interest and begin to look for other things to do. ______________________________

____

____

e. are fiddlers--that is, children who usually have several objects to play with in and around their desks such as rubber bands, erasers, small toys, etc., which keep them from their work. ______________________________

____

____

TEACHER______________________ SCHOOL______________________ GROUP__________
A or B

Appendix E

SAN CARLOS ELEMENTARY SCHOOL DISTRICT
Problem Behavior Checklist

PUPILS NAME________________________________ BIRTHDATE________ SEX_____
GRADE_______SCHOOL________________________TEACHER____________________

INSTRUCTIONS: Circle numbers 1 to 5 below for your estimate of how little or how much each statement describes this pupil. Use the following diagram as your guide.

1. Poor description (hardly ever happens)
2. Infrequent description (happens infrequently)
3. Fair description (happens half the time)
4. Good description (happens more than half the time)
5. Perfect description (happens just about all the time)

			Circle One			
1.	Talks out or shouts without permission	1	2	3	4	5
2.	Makes meaningless or animal noises	1	2	3	4	5
3.	Talks all the time	1	2	3	4	5
4.	Runs around in spite of prohibition	1	2	3	4	5
5.	Cannot or will not follow directions	1	2	3	4	5
6.	Distracted by every little thing around him	1	2	3	4	5
7.	Unable to maintain attention or concentrate	1	2	3	4	5
8.	Acts very impulsively, without thinking	1	2	3	4	5
9.	Gives up almost before he starts	1	2	3	4	5
10.	Fiddles with holes, marks, flaws, breaks	1	2	3	4	5
11.	Behavior does not improve with discipline	1	2	3	4	5
12.	Damages or destroys things	1	2	3	4	5
13.	Always vague or confused about things	1	2	3	4	5
14.	Elicits negative reactions from peers	1	2	3	4	5
15.	Pushes, bites, hits, paws others	1	2	3	4	5
16.	Cannot make or keep friends	1	2	3	4	5
17.	Complains that others mistreat him	1	2	3	4	5
18.	Always wants to change the rules	1	2	3	4	5
19.	Cannot tell how many of anything	1	2	3	4	5
20.	Quickly insists he cannot do a thing	1	2	3	4	5
21.	Seldom completes work	1	2	3	4	5
22.	Objects or refuses to go to school	1	2	3	4	5
23.	Does some things well, others poorly	1	2	3	4	5
24.	Other children make fun of him	1	2	3	4	5
25.	Prefers activities normal to younger children	1	2	3	4	5
26.	Seeks company of either younger or older children	1	2	3	4	5
27.	Plays or stays alone	1	2	3	4	5
28.	Withdraws, daydreams, stares	1	2	3	4	5
29.	Easily motivated to unacceptable behavior	1	2	3	4	5
30.	Annoys or antagonizes others	1	2	3	4	5
31.	Cannot bear to lose	1	2	3	4	5
32.	Is excluded from the play of others	1	2	3	4	5
33.	Has violent outbursts of temper	1	2	3	4	5
34.	Uses profane or obscene language	1	2	3	4	5
35.	Slovenly, unkempt appearance, messy	1	2	3	4	5
36.	Cries easily and often	1	2	3	4	5
37.	Is afraid of many things	1	2	3	4	5
38.	Complains of every little bump or scratch	1	2	3	4	5
39.	Mouths things, hands, materials	1	2	3	4	5